ELECTRICAL REVIEW

AN ILLUSTRATED WEEKLY JOURNAL OF SCIENTIFIC AND ELECTRICAL PROGRESS.

VOL. 34. No. 12. WEEKLY. | NEW YORK, WEDNESDAY, MARCH 22, 1899. | $3 PER ANNUM. SINGLE COPIES, 10 CENTS.

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VIEWS, NEWS AND INTERVIEWS.

"The telephone service in the city of Manila," said a resident of the Far East, "is very poor, but will undoubtedly be corrected, now that the Americans have taken charge of affairs. Although the existing company holds a franchise, I understand that it is in such form that unless the service is improved, the franchise will be forfeited. The overhead line construction is abominable. The wires are strung in a very slip-shod fashion from house-top to house-top, and an American telephone engineer would be horrified to view the work. Telephone instruments of English manufacture are used and these would be all right were the line construction even passable. The only chance an American telephone company could have in Manila would be in the event that the present franchise were annulled."

Mr. H. H. Vreeland, president of the Metropolitan Street Railway Company, of New York city, was confined to his home last week by injuries received while riding on Riverside Drive a few days ago. In the course of his ride the horse became frightened, and Mr. Vreeland kept in the saddle with difficulty. When he reached home he found that he had severely strained the muscles of his back.

A cable dispatch says that the use of "taxameter" cabs was begun in London on March 15. A good deal of fun was had at the expense of the drivers of the vehicles, who wore cream colored silk hats.

M. Secretan, founder of the Société des Métaux and chief agent of the famous copper ring of 1888, died on March 12, in Paris. In February, 1888, M. Secretan formed a French syndicate with the purpose of raising the price of copper, which was then unusually low. The syndicate successfully established a monopoly and had everything its own way until March of the following year, when it suddenly came to grief through a series of wild speculations, which M. Secretan had made in copper. It became necessary for M. Secretan to sell most of his personal property at public auction. Some of his pictures were also sold; 17 of them were afterward taken to London, where they brought him nearly $150,000. He managed to save enough from the wreck to live comfortably.

The German Trade Report for 1898, which has just been issued, shows continued improvement. The imports increased by $109,500,000 and the exports by $28,000,000. The total imports were $1,279,630,000. There was an increase of 50 per cent in the value of steel and iron imports over those of 1896, the amounts being $18,355,000, against $12,050,000. The imports of copper for electrical purposes also showed a notable augmentation, those for 1896 having been $19,410,000 and for 1898 $24,120,000.

It is reported that Signor Marconi has succeeded in telegraphing without wires from Alum Bay to Bournemouth, Eng., a distance of 15 miles, at the rate of 15 words a minute. He sent 1,000 words a day, and the messages were easily read.

Some English correspondents in Berlin assert that a contract has already been signed by the German Government and Mr. Cecil Rhodes for the construction of a telegraph line through German East Africa.

It cost the United Railways and Electric Company, of Baltimore, Md., $25,008 for tax stamps to be affixed to the deeds and mortgage placed on record last week as the culmination of the deal for the consolidation of all the street railways in Baltimore.

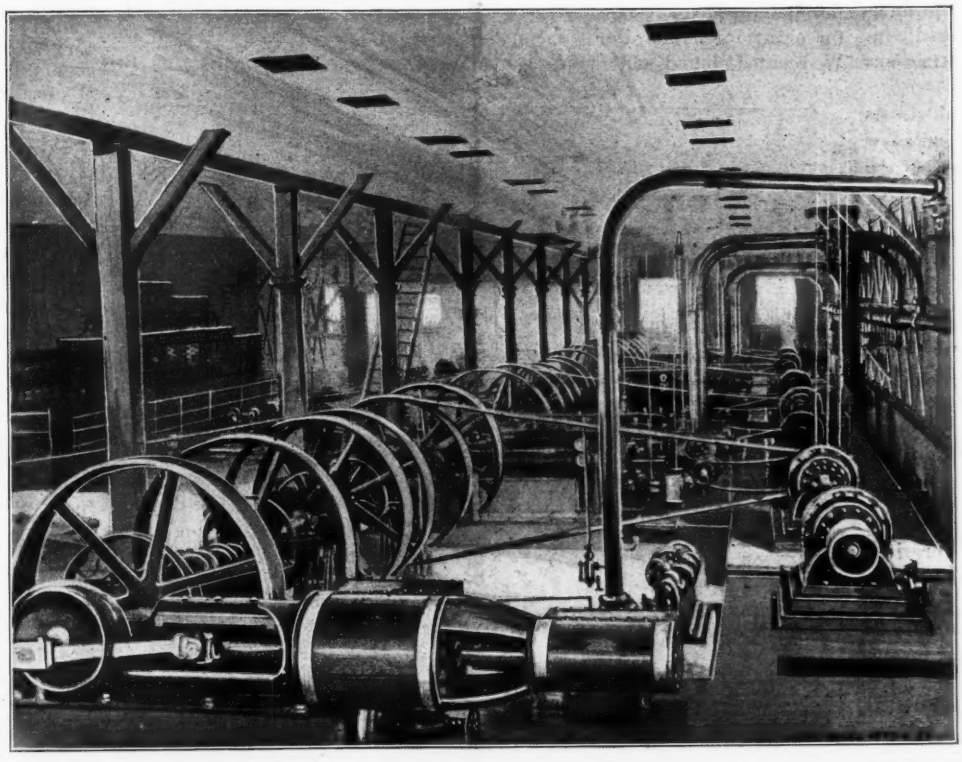


FIG. 1.—INTERIOR VIEW OF THE MANILA ELECTRIC LIGHT COMPANY'S CENTRAL STATION AT MANILA, PHILIPPINE ISLANDS.

THE ELECTRIC LIGHT PLANT AT MANILA.

THE LARGEST CITY IN OUR NEW POSSESSIONS IN THE FAR EAST IS EXCELLENTLY LIGHTED WITH ELECTRICITY.

Mr. A. L. Bagnall, the head of the well known firm of Bagnall & Hilles, of Yokohama, Japan, Singapore, Straits Settlements and Manila, Philippine Islands, is visiting the United States on business connected with his firm. In the course of an interview with a representative of the ELECTRICAL REVIEW Mr. Bagnall referred to the question of electrical progress and development in Manila as follows:

"The central station plant of the Manila Electric Light Company is centrally located in the city of Manila. It is first-class in every respect and both the street and commercial lighting of Manila compares splendidly with the average town of the United States. As you are aware the city of Manila is divided by the Pasig River, which separates the old from the new town. The Manila Electric Light Company's plant we installed a few years ago supplies current for light on each side of the river. The feeders between the two parts of the town are carried across the Pasig River on three bridges. They run as overhead lines on steel poles and are tapped to supply lights to each bridge. The line construction of the Manila Electric Light Company includes about 450 steel poles and 1,400 wooden poles. The lines are carried on oil-filled porcelain insulators.

"All the apparatus used is of American make except a part of the boiler plant, which consists of Galloway boilers, of English manufacture.

"The Manila Electric Light Com-

pany secured from the Municipal Council in 1895 a 20 years' contract for street lighting. It is evident, therefore, that this contract has about 16 years to run. Since the American authorities have taken possession of the Philippines it has been decided that they will recognize all contracts of this sort, and, in fact, since General Otis landed his troops and established military government he has been paying the bills for street lighting and other electrical work.

"Under the original contract for street lighting one hundred and forty 2,000-candle-power arc lamps and one thousand 20-candle-power series incandescent lamps were to be supplied at a bulk price of $60,250, Mexican, per year. The arcs are 20-volt lamps, running 50 in series, on a 1,000-volt circuit, direct. Of course, the number of street lights has materially increased since the original contract was made, in 1895.

"The city lighting covers all streets on both sides of the river except a few in several native quarters of the town.

"On wide streets the arc lamps are carried on steel poles set in the center of the roadway. The contract provides that the lights shall burn all night and every night from 20 minutes after sunset until 20 minutes before sunrise."

"How does the street lighting of Manila compare with that of American cities of corresponding size?"

"Excellently. Manila is a splendidly lighted city. Tourists and American naval officers who have visited Manila are always surprised at the completeness of our system and the high-class manner in which the plant is installed and maintained. We have received many compliments on this score."

"How about your commercial lighting?"

"Well, we now have in service for private lighting quite a number of arcs and about 6,000 incandescents. The latter are 16-candle-power lamps, running on 100 volts alternating through transformers. One of the first contracts for private lighting we secured was for the Governor's Palace, where we installed about 150 lights. Some residences in Manila have as many as 200 lights each.

"Since the Americans took possession of the city, the Manila Electric Light Company has been busy, day and night, installing electric lights in the barracks selected for the troops; churches, cock-pits and 'godowns' or warehouses were appropriated as quarters for the soldiers, and these are all being wired and connected with our lighting system."

"What prices do you get for private lighting?"

"About $1.50 per month for a 16-candle-power lamp burning half the night and $2 for an all-night lamp."

"Did you have any trouble to get customers at first?"

"No, indeed. The Chinese merchants took to electric lighting like wildfire, and the half-caste business men saw its advantages almost as quickly. In one spot in Manila there are over 2,000 incandescents in a space of about four blocks.

"By the way, when we heard in Yokohama that Admiral Dewey's fleet had sailed from Hong Kong for Manila, Paymaster McDonald, U. S. N., who is stationed at the naval hospital in Yokohama, came to me for electric fans for Dewey's ships. We scouted around and found about 20, and I got a man to sell back to me about 50 more that I had just delivered to him. These we shipped to our vessels as soon as possible, and I have no doubt they have added materially to the comfort of our naval officers aboard ship at Manila."

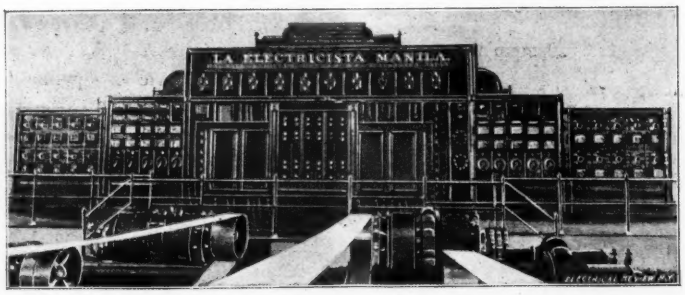


FIG. 2.—SWITCHBOARD IN THE CENTRAL STATION OF THE MANILA ELECTRIC LIGHT COMPANY AT MANILA, PHILIPPINE ISLANDS.

The plant of the Manila Electric Light Company is equipped with six compound-condensing engines of 300 horse-power each; 10 alternating-current generators, 2,000 volts, of 60 kilowatts capacity each, and four 65-light, 2,000-candle-power arc dynamos, running at 3,250 volts each. The capacity of the station, therefore, is about 12,000 incandescent lamps and 260 arc lamps. The switchboard capacity is 30,000 lights. The earnings of the company have been very satisfactory, and since the American occupation the price of the company's stock has materially advanced.

The capital stock of the company is $500,000, Mexican. The firm of Bagnall & Hilles is the largest individual, and the only American, stockholder. The Chinese and half-caste merchants hold considerable of the company's stock, and the control of the company is in the hands of Bagnall & Hilles and a number of prominent Spanish business men in Manila.

OHIO TELEPHONE ASSOCIATION.

ANNUAL MEETING HELD AT CLEVELAND—ATTENDANCE UNUSUALLY LARGE — REPORT OF THE TWO DAYS' SESSION—THE NEW OFFICERS.

The Ohio Telephone Association, an organization of the independent telephone companies in that state, met at the Hollenden Hotel, Cleveland, Ohio, in annual session, at ten o'clock A. M., Wednesday, March 15, 1899. The attendance was unusually large and a most harmonious and enthusiastic feeling was manifested by all.

There were present from Indiana, Hon. Simon P. Sheerin, president of the New Long-Distance Telephone Company, of Indiana; Samuel M. Foster and Geo. W. Beers, of Fort Wayne; from Michigan, Hon. E. B. Fisher, president of the Home Telephone Company, of Grand Rapids, and Hon. R. F. Johnson, president of the Saginaw Telephone Company, of Saginaw, and from Kentucky, W. B. Seaton, of Ashland. Among those present from Ohio were the following:

Kora F. Briggs, secretary and manager Home Telephone Co., Tiffin; W. M. Hesteltine, director Citizens' Telephone Co., Delaware; M. H. Bunkerhoff, secretary Upper Sandusky Telephone Co.; H. J. Curtis, director Sandusky Telephone Co., Sandusky; Leon S. Hubbell, Chagrin Falls Telephone Co., Chagrin Falls; Horton Park, secretary Kenton Telephone Co., Kenton; H. J. Barnes, manager Warren & Niles Telephone Co.; R. E. Connelly, secretary New Harrison Telephone Co., Toledo; J. Heter, president Huron County Telephone Co., Monroeville; A. B. Conklin, director Warren & Niles Telephone Co.; J. A. McLean, director Citizens' Telephone Co., Washington, C. H.; W. B. Seaton, president Lawrence Telephone Co., Ironton; C. H. Corey, director National Telephone Co., Lima; P. H. Hubbell, manager Chagrin Falls Telephone Co., Chagrin Falls; J. R. Swartz, manager Star Telephone Co., Ashland; V. W. Peck, vice-president Morrow County Telephone Co., Cardington; A. A. Whitney, president Morrow County Telephone Co.; Percy J. Smith and E. L. House, Painesville Telephone Co., Painesville; D. A. Yoder and C. E. Yoder, Northern Ohio Telephone Co., New London; H. E. Graham, manager Norwalk Telephone Co., Norwalk; W. R. Barkdull, manager Ohio Telephone Toll Line Co., Norwalk; A. Y. Gordon, manager Farmers' Telephone Co., Massillon; Solon C. Thayer, manager Newton Falls Telephone Co., Newton Falls; Will W. Morrison, Bryan Telephone Co., Bryan; James G. Palmer, secretary and manager Conneaut Telephone Company, Conneaut; Thos. Fricker, president Ashtabula Telephone Co., Ashtabula; Fred J. Bollinger, Port Clinton Telephone Co., Wauseon; E. G. Laughlin, secretary Carey Electric Telephone Co., Carey; Jas. M. Thomas, Home Telephone Co.; Chillicothe; Geo. Adams, president Millersburg Telephone Co.; S. C. Kissner, secretary Farmers and Merchants' Telephone Co., Warsaw; C. F. Moore, The Interstate Telephone Co., Cleveland; Joe S. Bailey, president Montpelier Telephone Co., Montpelier; H. Marvin, secretary Urbana Telephone Co., Urbana; C. D Juvenall, secretary London Telephone Co.; Ed L. Barber, Central Construction Co.; Wauseon; B. L. McElroy, Frank L. Beam, P. S. Kelser. H. D. Critchfield, Mt. Vernon; B. H. Evans, Youngstown Telephone Co.; Edward Kibler, Newark Telephone Co., Newark; Chas. E. Stasel, Newark; Harry Devin, Mt. Vernon Telephone Co., Mt. Vernon; Hoyt Ford, Mansfield; Bert Hubbell, Cleveland; A. R. Warner, Wellington; J. W. Lowe, Mentor; S. E. Mayon, Millersburg; A. V. Hageman, Lorain; A. B. Taylor, F. L. Fuller, Elyria; E. P. Johnson, Oberlin; Jno. C. Bolinger, Clyde; J. M. Hart, Collinwood; Jas. S. Brailey, Jr., Wauseon.

The first day was devoted to general discussion and reports of the condition of the independent telephone movement in different sections of the state. At 4.30 in the afternoon, upon invitation of the United States Telephone Company, of Cleveland, all of the visiting gentlemen were taken by special cars over the Lorain & Cleveland Electric Railroad to Avon Beach Park Hotel, where they were splendidly entertained at dinner. After dinner, Hon. Jas. M. Thomas acted as toastmaster, and the following toasts were responded to: "Our Guests," Harry B. McGraw, Cleveland, Ohio; "Independent Fraternity," Saml. M. Foster, Fort Wayne, Ind.; "Switchboard," Percy Smith, Painesville, Ohio; "Subscribers," Edward Kibler, Esq., Newark, Ohio; "Long Distance," Hon. George W. Beers, Fort Wayne, Ind.; "Country Manager," F. J. Bolinger, Clyde, Ohio; "Need of Harmony," R. F. Johnson, Saginaw, Mich.; "Hoosier Telephones," Hon.

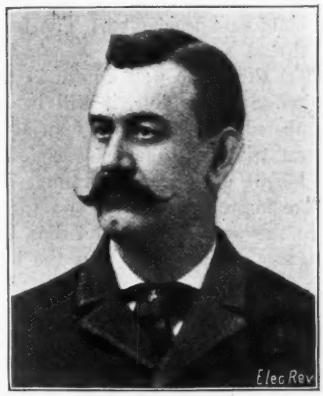
S. P. Sheerin, Indianapolis, Ind.; "Organization," H. D. Critchfield, Esq., Mount Vernon, Ohio; "Lightning Arresters," Hon. E. B. Fisher, Grand Rapids, Mich.

The meeting reconvened at 10 o'clock Thursday forenoon, the time being devoted to receiving reports of committees upon amendments to constitution, division of territory and contracts, which committees had been appointed at the preceding session. Reports of these committees were adopted as submitted after general discussion. The principal changes in the constitution are as follows: The membership fee was reduced to $5; the annual dues for companies having 100 telephones or less, $5; more than 100 telephones and less than 201, $7.50; 200 telephones and over, $10. The offices of secretary and treasurer were consolidated.

After the adoption of the amendments to the constitution the following officers were elected for the ensuing year: President, Hon. J. M. Thomas, Chillicothe; first vice-president, Kora F. Briggs, Tiffin; second vice-president, Edward Kibler, Newark; third vice-president, A. A. Whitney, Mt. Gilead, secretary and treasurer, H. D. Critchfield, Mt. Vernon, and the following members of the executive council: E. L. Barber, Wauseon; J. B. Hoge, Cleveland; D. J. Cable, Lima; W. H. Butler, Kent; H. J. Barnes, Warren; A. R. Warner, Wellington, and Thos. Fricker, Ashtabula.

Reports at this meeting developed that there are 121 independent telephone exchanges now in actual operation in Ohio, and about 2,500 miles of local toll lines connecting about 1,000 toll stations. The reports further show that 36 county seats have toll-line connections with substantially all the post offices in their respective counties, as well as communication with many adjacent county seats and other important towns and cities.

The need of first-class long-distance toll-line connections was freely commented upon, and a unanimous expression was given of the necessity of this business being carried on under the management of one strong company to connect all the independent exchanges and local toll lines now in existence and afford facilities for interstate communication by means of connection with long-distance toll lines now being built in all the adjacent states. This want will be supplied during the coming year by the United States Telephone Company, with headquarters at Cleveland, Ohio, which has already contracted for the material for more than 2,000 miles of pole lines of first-class construction, carrying full, copper metallic circuits for all business, and this work will be vigorously prosecuted and connections made with different independent exchanges and local toll line systems under contracts already signed by the majority of independent exchanges in



HON. J. M. THOMAS, PRESIDENT OHIO STATE TELEPHONE ASSOCIATION.

the state and now being rapidly signed. Every indication is that within a year all the independent exchanges in Ohio will be connected by means of the United States Telephone Company's copper, full metallic circuit lines. This will afford to the independent telephone companies the means of meeting the chief objection that has been urged by their competitors, and will add great strength to the independent movement. A large number of new companies became members of the state association, among them being the following:

Sandusky Telephone Co., Ravenna & Kent Home Telephone Co., Home Telephone Co., of Plain City; Kenton Telephone Co., Ashtabula Telephone Co., Wellington Telephone Co., Clyde Telephone Co., Northern Ohio Telephone Co., New London; Bryan Telephone Co., New Harrison Telephone Co., Toledo; Upper Sandusky Telephone Co., Kenton Telephone Co., Home Telephone Co., Tiffin; Farmers' Telephone Co., Massilon; Urbana Telephone Co., Elyria Telephone Co., Montpelier Telephone Co., Port Clinton Telephone Co., Millersburg Telephone Co.

This meeting was the best attended and most enthusiastic of any meeting held by the association since its organization in 1896, and gives evidence of most cordial relations and thorough understanding existing between all the independent telephone interests in Ohio.

CONVENTION NOTES.

Mr. J. G. Ihmsen, general manager of the Keystone Telephone Company, Pittsburgh, reached Cleveland Thursday evening.

Mr. P. C. Burns, president of the American Electric Telephone Company, Chicago, reached Cleveland on the second day of the meeting.

Mr. Burt Hubbell, who has recently become identified with the Williams Electric Company, Cleveland, was registered at the Hollenden during the meeting.

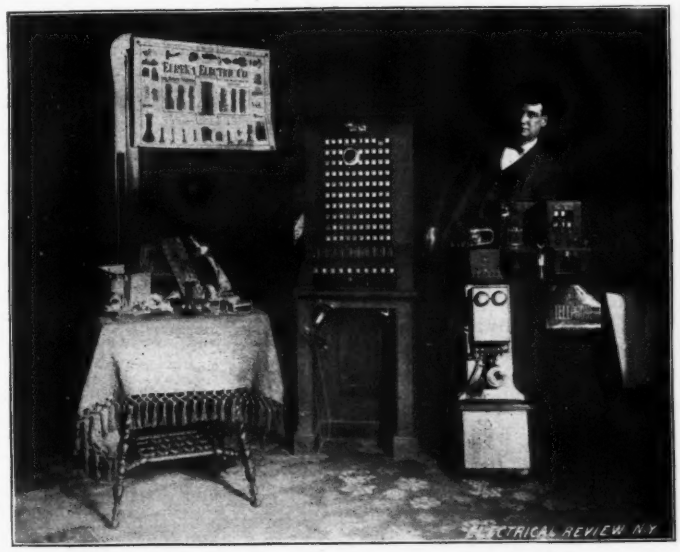


EXHIBIT OF THE EUREKA ELECTRIC COMPANY AT THE CLEVELAND TELEPHONE CONVENTION.

The Eureka Electric Company, Chicago, had sent an interesting line of telephone apparatus for exhibition in connection with the meeting. Mr. I. J. Kusel, of the company, was present in person.

Mr. William T. Blaine, president of the Victor Telephone Company, Chicago, reached Cleveland Friday to confer with other manufacturers about matters pertaining to the telephone industry.

Mr. J. P. McKinstry, of the Cleveland Telephone Company, paid a delicate compliment to the visiting telephonites by inviting them to inspect the new Cleveland exchange, which is one of the most modern in the world.

The Hipwell Manufacturing Company, Allegheny, Pa., were represented by Messrs. Hipwell and Miller. This company had prepared a general line of telephone apparatus for inspection by the visitors. The company make every part of their instrument, and are building an increase for their factory.

Mr. Joseph A. Williams, president of the Williams Electric Company and designer of the "Williams" magneto-bell and other telephone apparatus, was present. This company also showed a number of styles of their new instrument, which is just being introduced to the telephone field. Mr. B. Chamberlin, of the company, was also present.

THIRD ANNUAL CONVENTION OF THE IOWA TELEPHONE ASSOCIATION.

The third annual convention of the Iowa Telephone Association was held at Des Moines, Iowa, on March 14 and 15. A number of interesting papers were read and a proposition to unite all the independent telephone companies of the state was favorably discussed.

The following officers for the ensuing year were elected: President, George M. Bamby, of Perry; secretary, J. W. Hill, Mutual Telephone Company, Des Moines; treasurer, H. E. Teachout, Mutual Telephone Company, Des Moines.

The following committees were appointed:

Executive: Messrs. Wells, Himes, McFarlin and Bennett.

Consolidation: C. F. Bennett, Waterloo; W. H. Deering, Boone; J. S. Bellamy, Knoxville, and C. E. Wells, Boone.

Legislative: J. W. Hill and H. E. Teachout, Des Moines, and J. H. Brandt, Rockwell.

Grievance: C. G. Cockerill, Jefferson; H. C. Raney, Fairfield; C. G. Deering, Boone; D. N. Smith, Clearfield, and G. N. Bandy, Perry.

Among the electrical exhibitors represented at the convention were the Central Electric Company, American Electric Telephone Company, Stromberg-Carlson Telephone Manufacturing Company, Eureka Telephone Company, Electric Appliance Company, Des Moines Electric Company and others.

THE ANÆSTHETIC EFFECTS OF A SINUSOIDAL CURRENT OF HIGH FREQUENCY.

BY E. W. SCRIPTURE IN "SCIENCE."

In your issue of June 3, 1898, I had the honor of communicating an observation on the anæsthetic effects of a sinusoidal current of high frequency. I take the liberty of sending you the following further observations :

a. The anæsthetic effect may be produced by sending the current longitudinally along the nerve. Thus, a current sent along one of the nerves of the arm can be used to produce anæsthesia in parts of the arm supplied by it. With a pleasant current of about 28,000 alternations per second passing between the elbow and the hand, a needle can be painlessly run into the forearm.

b. At the suggestion of Prof. B. Moore, of the Yale Medical School, I applied the current to the tongue, with a view to testing the theory that the sensation of taste may be due to vibratory stimuli. If the theory were true the fluctuations in the sinusoidal current might be expected to produce sensations of taste of various kinds. The experiment showed that fluctuations up to about 29,000 complete periods per second produce no sensations of taste whatever; the only sensation is that of tickling and puckering.

c. It should, perhaps, have been stated in my original communication that the main purpose of the investigations with the sinusoidal current was to determine the various sensations at different frequencies. They have been determined for two subjects as follows : (1) Threshold of sensation of touch at a frequency of about 480 complete alternations per second ; (2) threshold of disagreeableness at about 840 ; (3) threshold of pain at about 960 ; (4) disappearance of pain at about 1,440, followed by a peculiar, agreeable sensation ; (5) disappearance of agreeableness at a point not yet determined, followed by a faint sensation ; (6) disappearance of sensation at a point not yet determined. For constant conditions these figures are quite constant, the probable error ranging from one-tenth of one per cent to four per cent.

d. Applying the electrodes to the nerves of the arm in a way to move the muscles of the forearm and hand, I find a similar neuro-muscular effect. As the current rises in frequency from zero the muscles contract steadily up to a certain point, after which they gradually relax. The process is the same when we start with a high frequency and descend to zero. The phenomenon can hardly be due to a diminished intensity of the high-frequency current.

e. It may be added that the instrument used is a Kennelly alternator run at a very high speed. Similar high-frequency machines have been used by Nikola Tesla, who has not recorded any of the above phenomena ; possibly his machines do not produce sinusoidal currents.

f. Using another machine which simply interrupted a galvanic current up to 100,000 times per second, I find that above a certain point (not yet measured) the interruptions cease to have any effect other than merely reducing the strength of the current when it is sent through the tissues.

Motor-Vehicle Competition at Liverpool.

United States Consul Boyle writes from Liverpool, February 17 : "In a recent consular report on 'Automotor freight wagons and freight rates in England,' attention was drawn to the forthcoming second trials of motor vehicles for heavy traffic at Liverpool. The official notification, containing conditions of the competition, has just been issued. The trials will begin on the morning of Monday, July 31, and will conclude on the evening of Wednesday, August 2. Trial runs will be made from Liverpool over distances from 30 to 40 miles. There will be four classes of vehicles eligible, the minimum loads being two tons, three and one-half tons, five tons and six tons (2,240 pounds to the ton). The vehicles must be propelled by mechanical power alone, but there will be no restriction on the source of the power or the nature of the agents used. The hope has been officially expressed that vehicles from the United States will take part in the competition. Those interested can secure printed copies of the details of the conditions, regulations, etc., on application to Mr. E. Shrapnell Smith, honorary secretary of the Self-Propelled Traffic Association, Royal Institution, Liverpool, England."

In the March *North American Review* H. T. Newcomb calls attention to "The Opposition to Railway Pooling." "One may well hope," he says, "that the ignorance which still insists that there can be genuine competition among railways will soon cease, and that railway owners and managers will perceive the wisdom of accepting whatever degree of effective federal regulation may be necessary to satisfy a reasonable public."

An International Standard for Screw Threads.

[*From the Engineering and Mining Journal.*]

The question of an international standard of metric screw threads was discussed at a congress which met for the purpose at Zurich last October, and as the result of their labors a certain standard form of thread and a number of standard diameters for bolts were decided on. The form of thread adopted is based on the Sellers thread, so well known in the United States. This, it will be remembered, has the shape of an equilateral triangle truncated one-eighth its height at top and bottom. To insure interchangeability, and to reduce the wear on taps and dies, the congress recommended that the bottom of the thread should be rounded off by any suitable curve, which should not deepen the cut more than an amount equal to one-sixteenth the pitch beyond the standard Sellers type. The apexes of the threads, on the contrary, are to be left flat as in the Sellers system. The following standard, sizes and pitches were decided on :

Diameter. Millimeters.	Pitch. Millimeters.
6 and 7	1.0
8 " 9	1.25
10 " 11	1.5
12	1.75
14 and 16	2.0
18, 20 " 22	2.5
24 " 27	3.0
30 " 30	3.5
36 " 39	4.0
42 " 45	4.5
48 " 52	5.0
56 " 60	5.5
64 " 68	6.0
72 " 76	6.5

The pitches chosen are, on the whole, somewhat finer than the Whitworth standards, much used in Great Britain, though in the case of the sizes most used—say between three-fourth-inch and one-and-one-half-inch—the two systems correspond very closely. This was to be expected, as the standards adopted by Whitworth and Sellers were due to a careful study of the results of many years' experiences. The principal factor in fixing them was the necessity of using threads which could be satisfactorily produced in cast-iron. Where wrought-iron or steel alone is employed much finer threads can be substituted with advantage ; and thus we find in bicycle work one-fourth-inch bolts with 30 to 26 threads per inch, three-eighth-inch bolts with 26 threads, and nine-sixteenth-inch bolts with 20 threads per inch, sizes which, to a certain extent, are becoming standard in the industry. It has long been a disputed point as to whether the Sellers or Whitworth thread is the better. Some mechanics think that the sharp corners existing in the former are objectionable, but the form has certainly the advantage of being more easily originated with exactitude. This point had no doubt considerable influence on the decisions of the Zurich congress, as the threads there chosen will probably be independently produced in many different establishments.

Electrical Contact Mines in Santiago Harbor.

In a meritorious paper by Lieut. E. E. Capehart, U. S. N., entitled "The Mine Defense of Santiago Harbor," published in the "Proceedings of the United States Naval Institute," the following occurs :

Nature had done everything to assist in the protection of the channel ; the electrical mines were of the most approved type, and the contact mines, if properly attended to, were dangerous to an enemy. But the very best of tools, if placed in the hands of inexperienced or indifferent workmen, will seldom give good results.

The mines in the entrance were said to have been planted by the officers of Admiral Cervera's fleet, and there were many evidences of the hurry with which they were put down. Lieutenant-Commander Delehanty, who commanded the "Suwanee," and who lifted the observation mines with his ship, says : "None of the mines were recovered intact. The connections were, as a rule, broken, the dry primers drowned out, or the mines partially exploded."

In many places the coverings of the branch cables were chafed off, and some of the strands of the wire bare, the result, no doubt, of paying the cable over the gunwale of the boat used in planting the mines.

The maxim, "that insulation is for the purpose of making electricity go where we want it to go," had evidently never occurred to the officers engaged.

In one electrical mine recovered, there was evidence of a partial explosion, which did not show at the surface of the water. The bottom of the mine was partially blown away, leaving about one-half of it intact, and inside the mine was a large quantity of wet guncotton, which rolled out of the hole in the bottom as the mine was lifted and lowered into the launch alongside of the "Suwanee."

ROENTGEN LIGHT NOTES.

BY WILLIAM ROLLINS.

NOTE LVI—ON AN ELECTRIC ALUMINUM INTERMOLECULAR VACUUM REGULATOR.

There is an old saying that nature abhors a vacuum. Well, so does a man when he tries to use an ordinary vacuum tube for producing Roentgen light for medical diagnosis. The vacuum gets higher and higher, until he

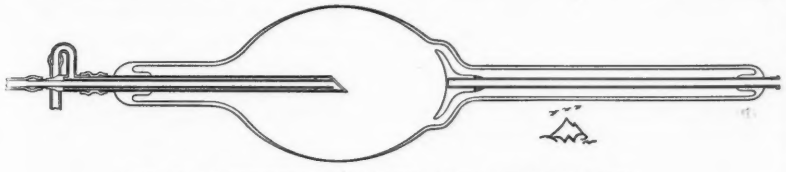


FIG. 55.—ROENTGEN LIGHT NOTES.—THE "A-W-L" TUBE.

sighs for Captain Leezur's log and one of his "narvine lozengers." However, nature always helps us if we give her half a chance, and in this and a subsequent note I shall illustrate a few of the practical methods we have used against our common enemy, the principle involved having been stated in Note LII.

When a Japanese shows his collection of bronzes, you see them one at a time, the ugly first. If you express sufficient interest, he produces afterward something graceful and beautiful. I shall, at least, begin in his way. Fig. 54 shows a vacuum regulator on the side of the tube. This is the place they have always occupied, except in tubes of my construction, one of which was shown in this journal for December 1, 1897. In such a position they have all the charm of a wart on a man's nose. The one here pictured is a particularly fine and large specimen of such a blemish. P is a platinum tube sealed to the glass, having an aluminum tube A soldered to its end. An adjustable arm AL is clamped to the aluminum tube by a milled-head screw to admit of easy removal when not in use, for any stray metal is an invitation to punctures. This plan was also applied to my platinum-hydrogen regulator. In this case, when I imagined the hydrogenium was exhausted, it was easily renewed by the procedure mentioned in the K. and O. catalogue. With the aluminum regulator here shown, when the vacuum is too high an electric force is sent through the arm to the aluminum. With onward rush we "ride the barriere," lowering the crest of the enemy. But, to finish the quotation, which is from the finest poems of recent years—

"Oh, hit or miss, how little 'tis
My lady is not there."

NOTE LVII—LENARD AND ROENTGEN.

In Note XIV, January 12, 1898, I gave a reason why Lenard's rays were feeble. Other experiments and comparisons, with a study of Lenard's work, have shown me that the discovery of the new light was due to Lenard and not to Roentgen, that X rays were known when Roentgen took up the investigation, and should therefore have been called Lenard's rays instead of unknown rays. What justly brought Roentgen into such prominence was his observation that the light of Lenard would penetrate the human body. Fraught with such possibilities for good to the race, it overshadowed the primary discovery. The same thing has happened more recently with a far more interesting discovery—the so-called Zeeman effect—a change in the spectrum lines in a magnetic field. The real discoverer was Fievez. During the 40 odd years I have lived this has happened so many times that I have almost come to believe it the usual course, and to wonder what useful purpose it may serve. Certainly most original men appear to be stimulated to renewed exertion by recognition, and of the few who seem indifferent, the majority are pressing forward to a shining mark whose light makes them forget the things achieved. Only one out of a wilderness of men sets his lance so high that praise or blame are one.

NOTE LVIII—THE A-W-L TUBE.

When I gave myself the pleasure of trying to make an efficient vacuum tube for my friend, Dr. F. H. Williams, who has done most to prove the prime importance of Roentgen's discovery in medical diagnosis, I knew nothing about the subject except that the tubes would bear but little force, the light in consequence being feeble, and that the vacuum rose rapidly until the quality of the light rendered it unfit for distinguishing between the human tissues and soon went out altogether. I therefore tried to discover principles which, when applied, should overcome these defects, so I cooled the target to permit of the use of more force and made some part of the walls of the tube of metal, hoping to send in particles between the molecules to lower the vacuum. In these notes I have shown various ways of accomplishing these results, and have mentioned some of the things which turned up on the way, part real and others perhaps unreal; but even illusions may not be without some value, else why should Father Felician have said, "trust to thy heart and what the world call illusions?"

There is no end to the improvements which others will make in this field, and my object here is to state these principles in order to prevent the possibility of their being covered by a patent. I hate patents in medicine and hope to see them abolished. In Fig. 55 I show a reasonably powerful, simple and graceful tube constructed on this plan.

In closing this first series of notes I mention that they will appear in future under the title of "Notes on Light," because I no longer believe Roentgen was the first discoverer of the light bearing his name, and to enable me to include experiments with light of other pitch.

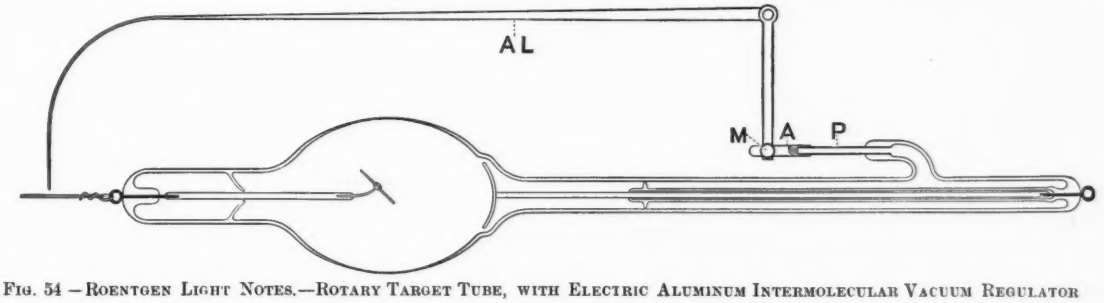


FIG. 54.—ROENTGEN LIGHT NOTES.—ROTARY TARGET TUBE, WITH ELECTRIC ALUMINUM INTERMOLECULAR VACUUM REGULATOR

Westinghouse Company Raises Wages.

The Westinghouse Electric and Manufacturing Company has raised wages from 15 to 20 per cent in two of the departments of its East Pittsburgh, Pa., shops. About 200 men are affected by the change.

The Twin City, Wis., Electric Company has completed its organization with a capital stock of $20,000. Work on the erection of a plant will be begun early in the Spring.

IMPORTANT—IF TRUE.

LETTER FROM A NON-SLUMBROUS QUAKER.

TO THE EDITOR OF ELECTRICAL REVIEW:

My uncle is a wealthy old gentleman who has been profitably mixed up in a number of electrical deals in Philadelphia and elsewhere. He invited me to dine with him the other evening at the Union League Club and told me a lot of things. Have you people in New York heard anything like this?

Uncle says he hears that the Widener–Elkins syndicate is buying up a lot of stock of both the General Electric and Westinghouse companies with the ultimate object of getting control of both of them. He says the same syndicate has arranged the purchase of the Fort Wayne Electric Corporation by the Siemens & Halske Electric Company of America, of Chicago, and that Charley Knight, the new manager of the latter company, is an excellent man in every way.

When you consider what large purchasers of electric railway and lighting apparatus the Whitney–Widener–Elkins crowd are, there seems to be some probability of my uncle's gossip being true. QUAKER.

Philadelphia, March 18.

The public lighting contract for the city of Havana calls for a perfect plant sufficient to light all of the larger buildings, which include the Custom House, Post Office, the Palace, which Governor Brooke is to occupy, and the military headquarters of General Ludlow and his staff, on Tacon row. Fifty arc lights and several thousand incandescents will be needed. The contract will not in any way conflict with the one for lighting the streets, which is now being figured on. The latter contract, according to a newspaper correspondent, will probably be captured by a New York firm.

The Freeport General Electric Company, of Freeport, Ill., has gone into the hands of a receiver.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

TIMES BUILDING, 41 PARK ROW,
P. O. BOX 2339. NEW YORK.

NEW YORK, MARCH 22, 1899.

CHARLES W. PRICE, - - - - - - - EDITOR.
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STEPHEN H. GODDARD, ADVERTISING MANAGER.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," - - - NEW YORK.

TELEPHONE CALL, 1546 "CORTLANDT."

NEW YORK OFFICE:
RUSSELL HOWLAND, REPRESENTATIVE,
Times Building, 41 Park Row.

WESTERN OFFICE:
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HENRY W. HALL, - - REPRESENTATIVE,
42 Old Broad Street, LONDON, E. C.
News, Subscriptions and Advertisements.

Subscription to the ELECTRICAL REVIEW.

One Year, United States and Canada, - - $3.00
One Year, Foreign Countries, - - - - - 5.00
Single Copies, - - - - - - - - - - .10
Copies can only be supplied for one year back at 25 cents each.

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The optimistic statisticians have great opportunities these days for figuring out the growth of the wealth of this country since values began to rise last Fall. Wall Street is giving them plenty of help, too, and nowadays the iconoclastic bear is busily engaged in acquiring all the graces of the Terpsichorean art.

During the latter part of February, the cable roads of St. Louis experienced some difficulty in running because of the cable slots contracting. The trouble was due to the sudden freezing of the material between the paving blocks forcing the slot rails together. The trouble is one inevitably incident to all conduit construction.—*Street Railway Review.*

Why, brother! We used to think that cold had a contracting effect. If the "material" between the paving blocks froze, how could the slot rails be forced together?

The American Society of Mechanical Engineers has issued in the form of a vest-pocket memorandum book a list of its members, as of January, 1899; arranged geographically. The idea is one of excellence and great convenience, especially to traveling members. We should like to see the American Institute of Electrical Engineers issue a similar list of its members.

When the two monster power plants of the street-railway companies of this city get fully to work their output will be about 150,000 horsepower. The ordinary individual can hardly realize what that means. But the statement becomes a little clearer when changed to mean that it would tow at greyhound speed a fleet of about 50 ordinary steamships, and the tow would be about as long as Broadway itself.

It is very striking to stand on Broadway uptown and watch an electric cab and one of the old-fashioned kind going in the same direction and see what a hopeless stern-chase the latter makes of it. By the way, when the electric cabs become, as they must, much more numerous and get into daily conversation, how are the two kinds to be distinguished in talking? Some shorter names will be needed than electric cab and horse hansom.

Copper seems to have reached top-notch in price. But will it stay there? During the past few years, when the price was low, many discoveries have been made of copper deposits by prospectors who were either looking for gold or had no means to develop and work copper properties. The high price now ruling for copper is an alluring bait for capital, and therefore many companies have lately come into existence with a view to opening up such properties and placing the output on the market, that they may get some of the cream.

Motor vehicles as sold in the United States will be about as useful in the city of Montreal as a wheel-barrow.—*Canadian Electrical News.*

It seems to us that our esteemed contemporary, in the words quoted, casts a reflection on the intelligence and progressiveness of the people of Montreal, which is not deserved. Moreover, American manufacturers of electric vehicles are so busy supplying the demands of our domestic users that it will be some time before they get around to Montreal. In the meantime, we fear, Montreal will be compelled to stand and wait.

Mrs. Martha Place, a murderess, was executed by electricity at Sing Sing prison on Monday of this week. Her crime was of such a character as to render her life forfeit. She deserved her fate, and Governor Roosevelt is to be commended for his refusal, in the absence of a single mitigating circumstance, to interfere with the fulfillment of the law. The only regret we have is that the laws of New York state require that capital punishment shall be carried out by means of barbarous electrocution. The instance of Mrs. Place is remarkable only from the fact that she was the first woman in history to be legally executed by electricity.

The latest use for electricity comes from the Klondike gold-bearing regions, where a wide-awake inventor was struck with the costliness and slowness of the methods used to thaw the frozen soil in order that it may be worked for the yellow metal. By the bonfire system most of the heat of the burning wood ascends into the air, and less than 20 per cent of it does the work intended. The inventor called on electricity to aid the miner, and it responded well. All the heat generated is absolutely under control, and can be applied just where it is wanted. It is claimed that 24 feet of frozen earth can be thawed by electricity in the same time which it takes a bonfire to thaw out one foot. The patent, it is said, has been recently sold by the inventor to an English syndicate for $35,000.

WELSBACH MANTLE THEORIES.

TO THE EDITOR OF ELECTRICAL REVIEW:

The letter from Prof. Elihu Thomson, in your last issue, on the cause of the intensity of light in Welsbach mantles, is a most interesting contribution to the much discussed question. The subject is one which will stand a great deal of investigation.

Some experiments I have made in the past, while not leading to any opinion opposed to the view of Professor Thomson, yet suggest a modification of his theory. He says his experiments and previous experience convinced him that the material of the burner itself did not possess any peculiar property of luminescence except under specific conditions of use, and that the light-giving quality was developed by immersing the mantle in that part of the flame where the combustible gases had not yet completed the combination with oxygen. But it seems to me this needs qualification, because there is apparently some sort of value to be placed on the material, since different bodies subjected to the same temperature and zone of combustion emit light in very different degrees.

A well made incandescent-lamp filament of carbon in a Bunsen flame will not glow as brightly as a filament of alumina, which, in turn, is less luminous than a filament of lime or magnesia. And the very marked differences in luminescence are not eliminated by any selection as to the zone of the flame. The filaments are readily produced by dipping stout cotton sewing thread into a strong solution of the nitrate, then drying and burning out the carbon and driving off the nitric acid, so as to leave the oxide alone. Delicacy and a steady hand insure success

A filament of pure thoria gives a moderately good light, but one containing a very small percentage of ceria emits a light of dazzling brilliancy. Many other combinations of oxides may be made to give similarly pronounced results. Yet, in the comparison, all are submitted to the same flame, under the same conditions, and all are subjected to the same temperature.

A filament of asbestos saturated with platinum chloride solution and incinerated in the flame ought, if the catalytic action of the gases alone determine the emission of light, to produce an intense effect, but such a filament is hardly noticeably better than one of lime.

On the other hand, an intensely brilliant light may be produced by platinum wire gauze on a modified

Bunsen burner. An air-blast is added to the burner till the solid flame produced over a Welsbach gauze tip is reduced to a field of little blue cones of flame less than one-eighth inch high. A piece of very fine platinum wire gauze, molded to dome shape, corresponding to that of the tip of the burner, and held so as to be just in the tips of the blue cones, emits a light of remarkable power, reaching some hundreds of candles per square inch of gauze.

The whole subject needs closer investigation than it has had and is an excellent field for experimental research. The specific heat of the bodies or of their metals may have some bearing on their behavior. The capacity for absorption or condensation of gases by the oxides is unknown.

Their heat radiating power must also have some bearing on their light emissivity. In the case of some oxides, the oscillation between different states of oxidation is a probable factor in the lighting power, particularly in the case of mantles, which hang in the extreme outer zone of the flame and form its boundary, where hot air has independent access to the incandescent oxide.

T. J. McTighe.

New York, March 18.

Wall Street and the Electrical Stock Market.

As compared with last Saturday the majority of stocks closed the week at lower prices. Speculation during the week was uncertain and irregular. The industrials were the strongest and most active features of the market. The drift of the higher grade securities seems to be out of Wall street and into the hands of investors. The latest trade reports show no abatement in business activity.

On the New York Stock Exchange General Electric closed to-day at 117 bid and 117½ asked, a loss of 1¼ points for the week. Edison Electric Illuminating of New York was not quoted to-day. Metropolitan Street Railway, of New York, closed at 255¾ bid and 256 asked, a gain of 2½ points for the week and 15 points in two weeks. Third Avenue Railroad, of New York, closed at 212 bid and 213 asked, a loss of 3½ points for the week.

On the Boston exchange American Bell Telephone closed at 343 bid and 344 asked, a gain of one point for the week. Erie Telephone closed at 88 bid and 89 asked, a loss of one point for the week.

On the Philadelphia exchange Electric Storage Battery common closed at 155 bid and 159 asked, a rise of 21 points for the week, 30 points for two weeks and 42 points for three weeks. Union Traction closed at 35¼ bid and 35¾ asked, a gain of ⅛ point for the week. Electric Vehicle was not quoted to-day.

Wall Street, March 18.

American Institute of Electrical Engineers.

The 133d meeting of the institute will be held at 12 West Thirty-first street, New York city, on Wednesday, March 22, 1899, at eight o'clock P. M. A paper will be presented by Dr. M. I. Pupin of New York city, on "The Propagation of Long Electrical Waves."

The Nernst Light in the United States.

The Nernst Electric Light, Limited, has been formed in London with a capital stock of £320,000 to exploit the Nerst light, invented by Prof. Walter Nernst, of Göttingen University, and recently described by the ELECTRICAL REVIEW. The prospectus of the company states that the rights of the invention for North America and Canada have been acquired by Mr. George Westinghouse.

More Data Regarding Electric Light Stations Wanted.

TO THE EDITOR OF ELECTRICAL REVIEW:

In common with many others, I have been struck by the lack of data on the results of operation of electric light plants. The Red Book of the *Street Railway Journal* gives most of the essential facts about street railroads, but there seems to be almost no similar published data about electric lighting.

We all understand that the electric light companies have been unwilling to give this information, and with more or less reason. It would seem, however, that business is getting on a sufficiently staple basis that no harm would result to the lighting companies if they should begin to give out, through the National Electric Light Association, some data as to earnings and operating expenses, both gross and per kilowatt hour.

I would respectfully suggest, therefore, that the ELECTRICAL REVIEW exercise some of its influence in inducing the National Electric Light Association to have its members publish some of this data. It will be of the greatest value to investors in electric light securities, either present or prospective, and will result in the end in great benefit to the business.

Very respectfully,

INVESTOR.

New York, N. Y., March 15.

PERSONAL.

Mr. S. D. Nesmith, of the Crocker-Wheeler company's Washington, D. C., office, was in New York city last week.

Mr. D. B. Dean, of Lester, Dean & Company, Chicago, dealers in railway supplies, made a brief visit to New York city last week.

Mr. H. H. Harrison, of J. G. White & Company, New York city, has been elected treasurer of the Lotos Club, of New York.

Mr. J. Potter, president of the Buckeye Electric Company, of Cleveland, Ohio, expects to return home from California about April 1.

Mr. B. F. Miles, the well known carbon magnate of Cleveland, Ohio, has been elected president of the recently formed linseed oil trust.

Mr. H. T. Johnson, of the Manhattan Electrical Supply Company, New York city, is enjoying a well earned vacation in Southern California.

Mr. E. M. Barr, New York manager for the Stirling Company, has removed his offices from 126 Liberty street to the new White Building at 95 Liberty street.

Mr. Leonard F. Requa, general manager of the Safety Insulated Wire and Cable Company, of New York city, has been enjoying a few days rest at Atlantic City.

Mr. H. H. Littell, general manager of the Buffalo, N. Y., Railway Company, is enjoying a vacation in Mexico. He is expected to return to Buffalo some time in May.

Col. Samuel M. Bryan, of Washington, D. C., until recently president of the Chesapeake & Potomac Telephone Company, made a flying visit to New York city last week.

Mr. John A. Seely, who is well known in nearly all lines of electrical work, is expecting to go to South America in about a week on business connected with a large asphalt paving company.

Mr. W. A. Stadelman, New York manager for the Brown Hoisting and Conveying Machine Company, of Cleveland, Ohio, sailed for Vera Cruz last week, to be absent about a month. Before his return Mr. Stadelman will visit Mexico city, Merida, Havana, Key West, Tampa and Savannah.

Mr. Sigmund Bergmann, who has disposed of all his electrical manufacturing interests in the United States, sailed from New York last week for Berlin, where he will hereafter make his home, and devote his entire time to his extensive electrical manufacturing establishments in that city.

WESTINGHOUSE SUES GENERAL ELECTRIC ON THE TESLA PATENTS.

The following important information is received by the ELECTRICAL REVIEW just as it goes to press. It would indicate that some new features have entered into the big electric lighting deal in New York city. There is also a rumor that this is an entering wedge in the split that is said to be likely to come between the General Electric and Westinghouse interests in the matter of their patent agreement. The electrical field will view with much interest and concern this new move. The statement the ELECTRICAL REVIEW has received is as follows:

The suit referred to in your inquiry is doubtless the suit which the Westinghouse company has instituted in the Circuit Court of the United States for the Northern District of New York, to enjoin the General Electric Company from delivering multiphase apparatus covered by the Tesla patents to the Edison Electric Illuminating Company of New York. The suit is brought under the agreement relating to patents which the General Electric and Westinghouse companies entered into in March, 1896, and the Westinghouse company contends that the apparatus in question can not be delivered by the General Electric Company to the New York Edison company because of the exclusive license under the Tesla patents which the Westinghouse Company's licensee in New York city, the United Electric Light and Power Company, has held for many years. The bill was filed at Utica, Tuesday, March 21, and the motion for a preliminary injunction is returnable Tuesday, April 4.

Mr. Francis E. Drake, director of machinery and electricity to the Paris Exposition of 1900, sailed from New York for Paris last week. During his absence the headquarters of the United States Commission will be at 120 Broadway, New York city, in charge of Mr. James S. Anthony from whom all information relating to the exposition may be obtained.

Mr. B. H. Scranton, president of the American Electrical Heater Company, of Detroit, Mich., spent several days in New York and the East last week. Mr. Scranton is a pioneer in the electric heating field, and his company is now reaping the reward of careful and intelligent development. The list of goods manufactured for electrical heating purposes has become quite large and the extent to which they enter into the household as well as in practical work is probably understood by but few people outside the special field.

A New Central Energy Telephone System.

FIG. 1.—VICTOR DESK TELEPHONE SET.

Among the most marked advances in the independent telephone field is the new central energy system recently introduced by the Victor Telephone Manufacturing Company, of Chicago. The great advantage of one large central unit constantly supplying power over a multitude of small ones giving power intermittently has long been recognized. But only of late years has any effort been put forth to apply this principle in telephony. The solution of the problem as worked out by the Victor Telephone Manufacturing Company is most interesting in its various possibilities. Its extreme flexibility at once commands the attention of the enterprising exchange manager.

So thoroughly have even the smallest details been studied and perfected

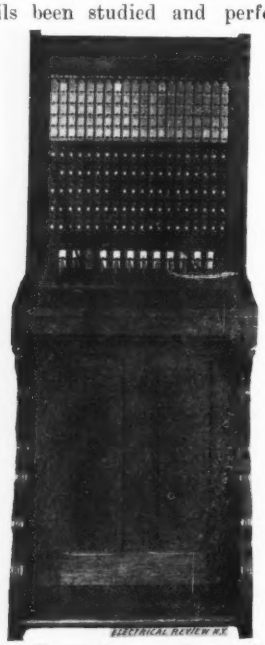

FIG. 2.—FRONT VIEW OF VICTOR TELEPHONE SWITCHBOARD.

that the changing over from the old system of magneto-calls simply amounts to changing the connections from the old board to the new, and then gradually changing over from the old subscribers' sets to the handsome instruments which this company supply. The largest exchange may be changed without the loss of a single call, and the great saving is manifest in its being possible to do all this with little or no "overtime work."

Party lines and toll lines may be connected to the same board and the same plugs used indiscriminately for them or for the standard subscribers' connections, thus doing away with many complications.

The switchboard still retains the simplicity, compactness and durability that have been characteristic of the Victor board. But little change has been made, all the auxiliary apparatus having been kept apart and put into a very tasty coil cabinet, where the fuses have been grouped together on a solid slate slab, protect-

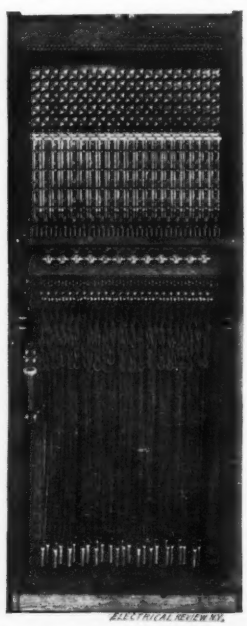

FIG. 3.—REAR VIEW OF VICTOR TELEPHONE SWITCHBOARD.

ing the battery from all accidental short circuits. The lower part of the cabinet is equipped with condensers and ironclad coils. The whole is surmounted by the battery bus-bars and their connectors, all ready for connecting direct to the battery switch. This cabinet may be placed where most convenient.

Connecting the coil cabinet to the switchboard has been reduced to the most simple operation, it only being necessary to run a cable from the cabinet to the switchboard, containing one pair of conductors for each cord.

This arrangement appeals directly to the practical man, as he still has the old familiar line terminating in a drop, the new apparatus being wholly in the coil cabinet under the central station man's care, who finds no difficulty in exchanging a new fuse for one burned out, should a line in use accidentally get crossed with a trolley line or other circuit.

The battery equipment possesses valuable features. Owing to the manner in which the lines are connected to the supply mains, the use of quite small cells is possible, thus reducing the first cost considerably.

The entire signal system is operative from the central power generators. The advantages of this method are obvious. Past experience has unmistakably demonstrated the superiority of the power-generator current over all others for positive service.

A system of automatic supervisory clearing-out signals has also been incorporated with the central energy system. These signals enable the operators to perform their duties with greater ease and rapidity than has heretofore been possible. Each plug has associated with it a separate signal which shows at a glance the position of the receiver hook of any line in whose jack the plug has been inserted. Thus the operator may ascertain without listening in on the cord circuit whether or not a called subscriber has answered. Should the supervisory signals show that one party has finished and the other party does not hang up his receiver, the

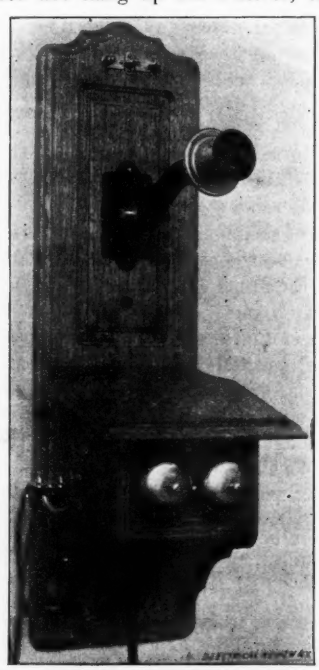

FIG. 4.—VICTOR LONG-DISTANCE WALL TELEPHONE SET.

operator knows that a new connection is wanted. The listening key is pressed, the new number asked for, and the connection completed, it having been necessary to use only the second plug, instead of the common method with its harassing delays and confusion when a subscriber wishes to call up several parties in turn.

Throughout the system only such apparatus has been used as has been proved in the old magneto-call and local battery systems to be reliable and trustworthy. The ringers are the standard series ringers universally used; the receiver is the Victor double-pole receiver. The hollow-arm transmitter needs but a careful inspection to convince one of its perfect design. Thus is afforded, as a whole, an installation whose parts are those with which the every-day telephone man is familiar, putting before him nothing but what he is used to. Many other conveniences are combined in this, one of the latest of telephone exchange equipments.

New York Electrical Society.

Probably no finer collection of lightning photographs has ever been exhibited in this city than were thrown on the screen on March 9 in the large hall in the Havemeyer Building, Columbia University, at the 195th meeting of the New York Electrical Society. The lecture thus illustrated, entitled "Modern Research into Lightning Phenomena and Building Protection," was devoted by Mr. W. J. Jenks to a recital of the various forms of lightning flashes which have come within his investigation during many years.

The one hour allowed for the lecture did not suffice for the treatment of the last section, and some of the most striking of Mr. Jenks's slides, those of ribbon flashes, had to be omitted. It is announced that the lecture will be repeated, without the abridgment which was in this case inevitable, before the Brooklyn Institute of Arts and Sciences, on Friday, March 24.

Mr. Jenks's remarks were followed by an address by Mr. A. J. Wurts, on "Original Investigation into the Protection of Electrical Circuits from Lightning."

What Mr. Wurts has to say on the subject of lightning arresters, on which he is a widely recognized authority, is always instructive and entertaining, and the beautiful experiments which accompanied his talk on Thursday evening, for which quite elaborate preparation had been made, delighted the large audience, which included many ladies.

The following members were elected at the meeting on March 9:

Albert C. Jahl, Burnet company, 115 Maiden lane, New York city; T. E. Crossman, 29 Broadway, New York city; W. H. Lawrence, 49 West Twenty-sixth street, New York city; C. J. Field, 30 Broad street, New York city; George M. Werner, Excelsior Electric Company, 204 Willoughby street, Brooklyn, N. Y.; George C. Anthon, Box 230, New York Athletic Club, New York city; Charles Klein, 52 East Third street, New York city.

Large Transformers for the Niagara Falls Power Company.

A recent order placed by the Niagara Falls Power Company is for seven 2,500-horse power transformers, involving the largest units that have ever been manufactured. The transformers will be of the Westinghouse standard, oil-insulated, water-cooled type. The cooling is effected by the circulation of water through coils of brass pipe immersed in the oil, so that no fans, blowers, pumps or motors will be required. This construction, therefore, eliminates any loss of power in the revolving elements of auxiliary devices.

These transformers will be of the same type and of the same general appearance as the four 350-kilowatt transformers which were built by the Westinghouse Electric and Manufacturing Company for the Cataract Power and Conduit Company, and installed about a year ago in their Ohio street substation, in Buffalo. The entire satisfaction given by these transformers, and by others of similar design which have been in use for several years at Niagara Falls, led to the selection of this type of transformer for the new installation in the Niagara company's power-house.

The efficiency of these transformers will be remarkably high. At full load it will be considerably over 98 per cent; at half load over 98 per cent, and at quarter load over 97 per cent.

At present these transformers will be used in stepping up the two-phase, 2,200-volt current from the generators to the three-phase, 4,400-volt current for supplying the Union Carbide Company. They may also be used in stepping up to 11,000 and 22,000 volts, three-phase, these being the voltages used in transmitting the power to Buffalo; or they may be employed as reducing transformers, lowering from 11,000 or 22,000 volts, three-phase, to 2,200 or 4,400 volts, two-phase or three-phase.

It is interesting to note the growth of the Westinghouse company's oil transformer business, the total outputs of which for the seven years ending December, 1898, were 146,340 horsepower. During the year 1895 they installed 5,600 horse-power in oil-insulated transformers; in 1896, 17,100 horse-power; in 1897, 30,633 horsepower, and in 1898, 90,000 horsepower. The present year will show a record for which the previous years will present no parallel.

Considering the circumstances under which this contract was awarded—the disadvantage of having to change from one type of transformer to another, and the fact that they are the largest units ever constructed—it is one of the most satisfoctory indorsements ever given a manufacturer of transformers.

Combination of Washington, D. C., Electrical Interests.

A press dispatch from Washington, D. C., says that it was announced on March 18 that the sale of the Metropolitan and Columbia street railroads, which has been pending for several months, has been completed, and that the transfer of stock conveying ownership will be made in a day or two. This is the largest transaction of the kind that ever occurred in Washington, involving in the case of the Metropolitan company the payment of something like $4,000,000, and in that of the Columbia of over $1,000,000. But this sale, in the opinion of many persons interested, is but the first step in an immense combination which will include the two electric light companies of the District, the gas companies of Washington and Georgetown, and all the street railroad lines save those of the Capital Traction Company, the old Washington and Georgetown. The capital stock of the combined organization will be $25,000,000 or $30,000,000. The negotiations for the purchase of the railroad properties were conducted by an agent of the purchasers, unknown to the owners of the roads, who refused to disclose the identity of his principals. In effecting the consolidation of the two electric light companies, which was accomplished some time ago, Senator Smith, of New Jersey, was said to be a controlling spirit.

The Northville, Mich., Council has granted a franchise to the Detroit, Plymouth & Northville Electric Railway. The line is to be in operation by June.

The National Automatic Telephone System.

The National Automatic Telephone Company, of Salina, Kas., and 71 to 75 West Jackson Boulevard, Chicago, are the manufacturers of an automatic telephone system invented by the company's superintendent, Mr. Frank A. Lundquist, and illustrated herewith. In Fig. 1 is shown a subscriber's instrument and in Fig. 2 is shown a 100-point central exchange switchboard of 1,000 capacity. In the latter three sections are filled, leaving two sections to be filled as subscribers increase. The dimensions of this board are eight and one-half feet long, five feet high and one foot wide.

FIG. 1.—NATIONAL AUTOMATIC TELEPHONE COMPANY'S SUBSCRIBER'S INSTRUMENT.

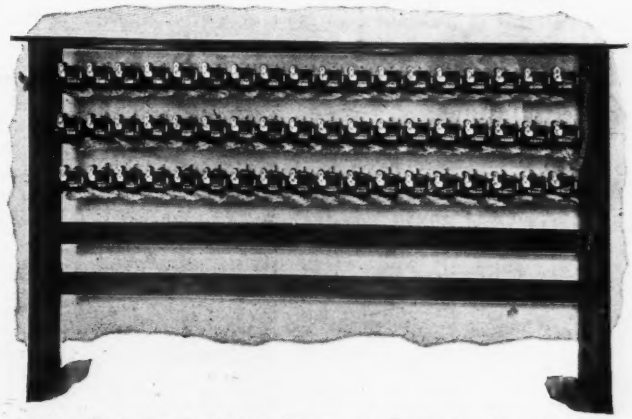

FIG. 2.—NATIONAL AUTOMATIC TELEPHONE COMPANY'S CENTRAL OFFICE 100-POINT SWITCHBOARD, 1,000 CAPACITY.

It may be said for the system that it is beyond the experimental stage, that it has been in use for two years, that there are over 30 exchanges equipped with this system, and that according to the manufacturers not one of the instruments has ever been taken out for any reason; but, on the contrary, that every instrument has given and is giving thorough satisfaction. The telephones are very simple in construction and neat in appearance. The manipulation is very simple. The switchboard at central consists of a cabinet wherein are placed as many automatic devices as there are telephones connected with the exchange. Each device responds to its respective telephone. The instruments are used and placed, and do the same as other systems, except that each subscriber at will connects himself to any other subscriber without any outside assistance.

It is stated that exchanges using this system have worked for two weeks without any one having entered the central office or given any attention to the running of the system, and every instrument has given perfect service. There is not a point or coil in the switchboard that will not carry, it is claimed, fully 20 times the amount of an ordinary switchboard.

Annual Meeting of the Western Telephone Construction Company.

The sixth annual meeting of the stockholders of the Western Telephone Construction Company was held at its offices, 250 South Clinton street, Chicago, Ill., on March 13. The meeting was characterized by the entire harmony of the stockholders present, and the same board of directors was reelected for the ensuing year. The thanks of the stockholders were unanimously voted to the officers for the results of the year's business. The statement showed a remarkable increase in the earnings of the company and in the extension of its property, the balance sheet showing assets of about $200,000 in excess of its liabilities. The orders on its books are greater than at any time in its history. It is working its factory night and day. Within the last 30 days it has been enabled to increase its output by 50 per cent, through the addition of considerable machinery and new tools.

It is learned that the company, some six months ago, had made very extensive contracts for raw materials involved in its product for the year 1899. The extent of this may be better shown by the fact that, in one line of materials alone, the difference in the market price to-day and that on which the same are contracted amounts to nearly $30,000.

It is intimated that a considerable amount of additional cash capital has just been added to the resources of the company, enabling it to largely increase its output and place upon the market some very valuable devices, which have been withheld from production until now.

The Williams Electric Company's Telephones.

The Williams Electric Company, of Cleveland, Ohio, until recently have confined their telephone work to the manufacture of magneto-bells and receivers. Their success in the development of this apparatus has been so pronounced that they decided about January 1 to go more completely into the business of manufacturing a complete line of telephone appliances.

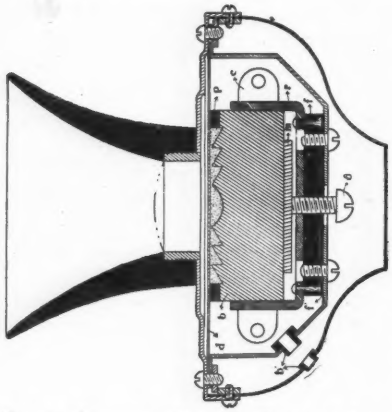

FIG. 1.—SECTIONAL VIEW OF WILLIAMS ELECTRIC COMPANY'S TELEPHONE TRANSMITTER.

FIG. 2.—WILLIAMS ELECTRIC COMPANY'S LONG-DISTANCE WALL TELEPHONE SET.

The new instrument made by this company has a magneto-bell with many new features in its construction, notably a single-spool ringer, which is so located in relation to the permanent magnet as to get, it is claimed, better results on a given current than can be obtained from a double-spool ringer. Also the gear used is built on more scientific principles, equalizing the wear on the small wheel with that of the large wheel.

The magnets are all nickel-plated. The automatic shunt is positive in its action, involving several new ideas.

Great care is taken in making the transmitter substantial and positive in its adjustment. All parts except the mouth-piece are of metal. No rubber or composition is used in making the transmitter, and it is not subjected to uncertainty of adjustment by the contraction and expansion of the rubber.

The new form of receiver possesses extreme strength of magnets, easy form of adjustment, patented binding posts making it impossible for the receiving cord tips to touch each other.

The threads on the metal ring are moulded into the rubber case, providing against any shrinkage of the shell and holding the ear-piece in proper position.

We present herewith two illustrations recently made of the interior of the Williams Electric Company's factory at Cleveland. This factory now ranks as one of the well equipped telephone shops, as the company has the most modern and complete mechanical facilities in all its departments. Until recently they have confined their efforts to the production of magneto-bells, receivers and special telephone parts, but are now offering a complete telephone instrument, every part of which is made in the Williams shops. As the result of the great increase in business the company has increased its capitalization from $25,000 to $50,000.

Massachusetts Institute of Technology, Boston.

The additional room gained by the engineering laboratories through the erection of the Pierce Building, and the addition of the new tandem compound engine now being run, allow of a greater variety of work during an exercise. Where 30 men formerly worked on one engine and its pumps, 15 men now work on each engine. This gives the men twice as much work as formerly, and the opportunity to learn very much more. The tandem compound engine discharges into a condenser having an air-pump beneath it. The air-pump is so high above the basement that indicator cards may be taken on both ends during the engine tests, and students may take cards from the air-pumps as well as from the engine.

An interesting test is just begun in this department. It is to determine the modulus of elasticity or the deflection due to a load applied for a long interval (in this case a year), in comparison with that due to a suddenly applied load. It appeared from tests made many years ago at the institute that the "time" modulus was about one-half that for the sudden application. The old tests were all on sticks of moderate size. The new apparatus now put in the basement of the building called "Engineering B" is capable of taking eight 6 by 12 hard pine beams at one time and giving a fiber stress of 2,500 pounds on each beam. The machine has just been set up with eight beams subjected to a load producing a fiber stress of 2,000 pounds. The deflections of each beam are measured with a micrometer. The deflections are measured daily during the early part of the experiment. Record will be kept of these deflections and of any other change that takes place through the Summer and into the next year.

Tests will soon be undertaken on the strength of timber as affected by moisture. As an accessory, a masonry kiln has been constructed, 22 feet long, four feet wide and three and one-half feet high. In the bottom are coils of inch steam-pipe, supplied continually with boiler steam. Air is driven by a blower under these coils and about the timber which is placed directly overhead, and the moist air drawn off through a series of pipes with openings at the top. During the night circulation is maintained by a 20-foot stack. The kiln has galvanized iron double doors, and will take eight 6 by 12 sticks at a time.

FIG. 3.—INTERIOR VIEW IN THE WILLIAMS ELECTRIC COMPANY'S TELEPHONE FACTORY.

The senior class has recently made two tests, each 84 hours' duration on the battery of boilers in the engineering boiler-house. During the first test, three boilers were run; in the second test the two new boilers only. It happened that the second test was made during extremely cold weather and the two boilers were run at the rate of 255 horse-power, this being about 80 horse-power above rating. The students were divided into squads of four, each squad working eight hours. Particular attention was given to the analysis of flue gases, and the fire was regulated in accordance with the results of the different analyses.

FIG. 4.—INTERIOR VIEW IN THE WILLIAMS ELECTRIC COMPANY'S TELEPHONE FACTORY.

A New Telephone Exchange with Central Energy System at Henderson, Ky.

The telephone exchange recently installed by the Henderson Telephone and Telegraph Company, of Henderson, Ky., is particularly interesting, as it is another example demonstrating the desirability of centralizing the sources of energy in public telephone exchanges. All the batteries in this entire system are located at the central office, as well as all the power used for subscribers calling the central office.

With the batteries and generator taken away from the subscriber's station, it leaves practically nothing requiring attention and the subscribers are not annoyed by inspectors' visits, which are necessary in local battery systems.

The telephone equipment for this system was manufactured by the Stromberg-Carlson Telephone Manufacturing Company, of Chicago. While this company's central energy system has been in actual operation for more than two years in many large private plants and for nearly a year in public exchange use, the Henderson plant is especially interesting, because of its having many new features and the class of construction adopted and the standing of the men interested in the company.

The company was formed by Messrs. H. K. Cole, of Owensboro, and J. W. Walker, of Morganfield, Ky., who secured as the principal stockholders of the company the most prominent business men in Henderson and Morganfield. The present officers of the company are: President, A. Waller; vice-president, O. W. Rash; secretary and treasurer, O. P. Dyer.

The construction of the exchange and the selecting of the system was intrusted to Messrs. Cole and Walker, who have had wide experience in the telephone business, having large interests in other exchanges and being thoroughly familiar with the best class of construction and equipment. The outside construction is strictly copper-metallic throughout, using considerable paper-insulated cable on the principal leads.

Fig. 1 shows four sections of 100 connections each of the central office switchboard. The original equipment installed serves 400 subscribers, with which number the exchange started. The board, in appearance, is similar to the S.-C. individual generator call and local battery switchboard, but is wired for the central-energy system.

In the top panel of each section are mounted five rows each of 20 drops. In the panel underneath are five rows each of 20 line-jacks, and sufficient trunking jacks for 10 sections or a 1,000-subscriber exchange. The board is also provided with a hand-generator for operator's use to call subscribers in case of emergency. The board is fully protected with combination fuse and carbon-lightning arresters. Ten 100-pair cables enter the office and terminate in pot-heads immediately underneath the distributing-board and lightning arresters, from where they are run to the switchboard-room.

Fig. 2 shows the ringing and battery charging equipment. The motor generator is run by the trolley line circuit and supplies the energy for subscribers ringing the central office and also the current used for charging the storage batteries. In this system the subscriber signals the central office by pressing the push-button at the lower end of the instrument, while the "disconnect" signal is automatically given by replacing the receiver on the hook. In this way, it is impossible to fail in giving the disconnect signal.

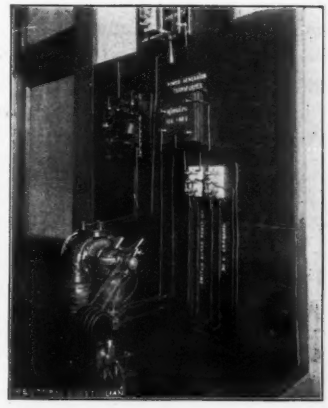

FIG. 2.—CENTRAL ENERGY SYSTEM AT HENDERSON, KY., RINGING AND BATTERY-CHARGING EQUIPMENT.

FIG. 3.—CENTRAL ENERGY SYSTEM AT HENDERSON, KY., BATTERY EQUIPMENT AT EXCHANGE.

Power for operating the generator used in calling subscribers by the operators is secured from the same source. At the upper end of this cut is shown a 500-volt double-pole knife switch for throwing on the electric light current.

In the center will be seen a C.-H. starting box and the power generator transformer. Underneath the transformer are the generator circuit switch and battery charging switch. Fig. 3 shows the subscribers' and operators' telephone talking battery in duplicate, also a set of batteries used for the subscribers ringing the central office. This is an emergency battery, and is used when the power or motor generators are out of service, or can be used as a talking battery in place of the storage batteries.

Fig. 4 shows the new type of telephones used in central energy exchanges. The instrument is equipped with the S.-C. long-distance transmitter, double-pole receiver, with a long lever switch with platinum contact. The bells are compactly mounted at the top of the instrument, below the lightning arrester.

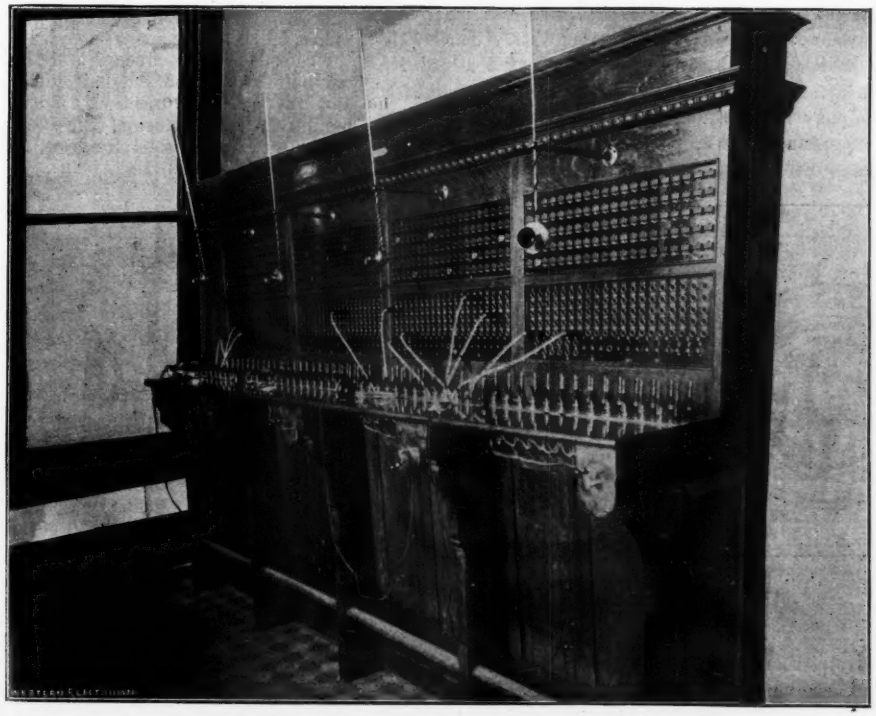

FIG. 1.—CENTRAL ENERGY SYSTEM AT HENDERSON, KY., 400-LINE BOARD.

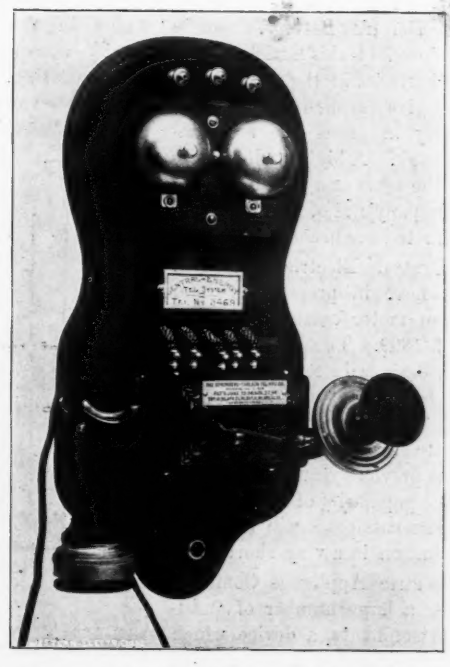

FIG. 4.—CENTRAL ENERGY SYSTEM AT HENDERSON, KY., SUBSCRIBER'S EQUIPMENT.

CHICAGO TRADE NEWS.

The Osborne Electric Manufacturing Company, of 296 Dearborn street, Chicago, are agents for Chicago and vicinity for the standard motor fan apparatus made by the Robbins & Meyers company, of Springfield. They are also agents for the Sterling arc lamp in this territory.

Roth Brothers & Company have resumed business at 88–92 West Jackson street. Recently they were burned out of their old quarters, but expect within a few weeks to be able to fill all orders promptly. They are now fitting out their new factory and making extensive preparations to carry on their business as before.

The Peru Electric Manufacturing Company, Peru, Ind. manufacturers of the Hercules Battery, claim to have produced in this article one of the best batteries in the market. It is said to give excellent satisfaction, particularly in gas-engine and gas-lighting work. A high-grade battery given to the users at a reasonable cost is the company's aim, and this fact they claim to have accomplished.

The Central Electric Company, Chicago, have in preparation their special fan motor catalogue for the season of 1899. The catalogue will show new designs in ceiling and desk fans for both direct and alternating current. The company are looking forward to a busy season in fan motors, as previous years have demonstrated the popularity of the "Central Fan." The catalogue will be ready for distribution in a very short time.

The Electric Appliance Company are selling a large number of "Advance" attachments, a device which is used to electrically ignite Welsbach gas burners. It is a decided improvement over the old method of lighting the burner, as there is always more or less of an explosion when ignited in the old way, damaging and sometimes destroying the delicate mantle used in these burners. The Appliance company say they find it a very rapid seller.

The Chicago Fuse Wire and Manufacturing Company, 154 Lake street, Chicago, are manufacturers of the "Trade-Mark" line of fuse wire and links, and are also makers of the "Standard" telephone and telegraph fuses and holders. The fuse wire is shipped to the consumer on a tin spool having the words "Tested Fuse Wire." It is warranted for 10 amperes of current. They have lately issued Bulletin No. 10, which is a descriptive illustrated circular and price list. This will be sent to any address on application.

The McIntosh Battery and Optical Company, 521 to 531 Wabash avenue, have recently made extensive improvements in their factory which will greatly increase their facilities for manufacturing. This company have long enjoyed an enviable reputation in the manufacture of high-class medical batteries, electrodes and electro-therapeutical specialties, and are also makers of the Jewell standard amperemeter, an excellent instrument in every particular. Their 1899 catalogue is now ready for distribution.

Mr. Wm. Hood, for years well known in the electrical field, has connected himself with the Oklahoma Cement and Plaster Company, of Cleveland, Ohio. Mr. Hood will hereafter devote his time to looking after the Chicago offices of the company, located at 159 LaSalle street. L. H. Rogers, for some time connected with the Brush, Adams–Bagnall and Fort Wayne lamp companies, is treasurer of this concern. Mr. Hood's numerous friends wish him every success in his new venture.

Chicago, March 18. F. E. C.

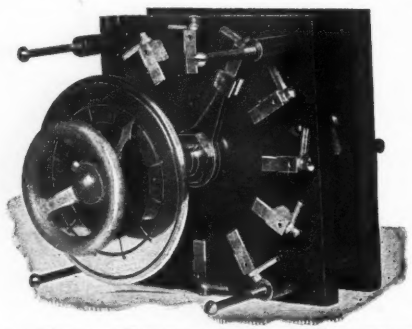

FIG. 1.—WESTERN ELECTRIC COMPANY'S INSTRUMENT SWITCH, UNMOUNTED.

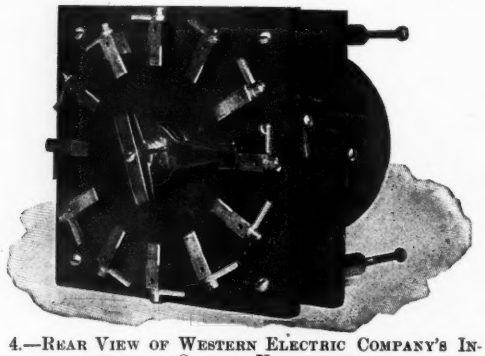

FIG. 4.—REAR VIEW OF WESTERN ELECTRIC COMPANY'S INSTRUMENT SWITCH, UNMOUNTED.

J. H. Bunnell & Company.

The well known electrical supply house of J. H. Bunnell & Company, which was established 21 years ago in New York city, will be continued at 76 Cortlandt street, corner of Washington, under the present name by the surviving partner, Mr. Charles McLaughlin. The recent death of Mr. Jesse H. Bunnell will be remembered by our readers. Mr. McLaughlin, who was a member of the firm from the first and was the active business manager of the house, will continue to maintain the high standard of product for which the company is famous the world over. There is perhaps no one in the electrical supply business more thoroughly acquainted with it than Mr. McLaughlin, and the ELECTRICAL REVIEW extends to him its best wishes for the continued and well merited success of the company he so ably manages.

Western Electric Company's Instrument Switch.

In the accompanying illustrations is shown a new switch, designed and placed on the market by the Western Electric Company, Chicago, to meet the demand for a substantial voltmeter and ammeter switch. Fig. 1 shows a front view of the switch unmounted. Fig. 2 is a front view, showing the device mounted on the switchboard. Fig. 3 is a sectional view through the switchboard, and Fig. 4 is a rear view of the unmounted switch.

The contact points of opposite polarity are mounted on separate slabs of white marble, which are fastened to the back of the switchboard. The switch is controlled from the face of the board by a neat hand-wheel and index plate. It has a positive knife-switch contact capable of carrying 15 amperes. This feature specially adapts it for use as a multiple shunt ammeter switch, as uniformly low-resistance contact is necessary for accurate results.

The hand-wheel and index plate are furnished with a polished copper finish. All switches are provided with removable collars on the screws which hold them to the switchboard, so that they may be mounted on marble or slate, one, one and one-quarter, one and one-half or two inches thick. The space occupied on the back of the switchboard is six and one-half by six and one-half inches, and the switch projects six inches behind the rear surface of the board. Switches are furnished for from two to 12 circuits, inclusive.

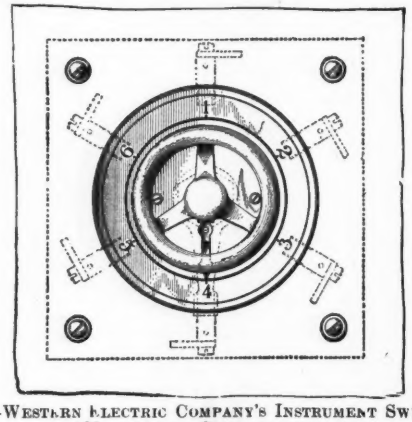

FIG. 2.—WESTERN ELECTRIC COMPANY'S INSTRUMENT SWITCH, MOUNTED ON SWITCHBOARD.

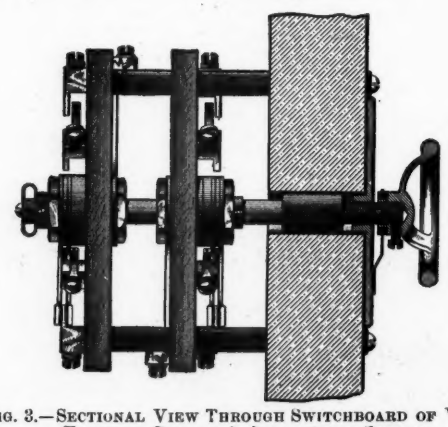

FIG. 3.—SECTIONAL VIEW THROUGH SWITCHBOARD OF WESTERN ELECTRIC COMPANY'S INSTRUMENT SWITCH.

Formula for Coloring Incandescent Lamps Wanted.

TO THE EDITOR OF ELECTRICAL REVIEW:

I take the liberty to trouble you for a chemical formula to stain glass blue or red. Thanking you,

Very truly yours,

H. MEISLAHN

Tampa, Fla., March 10.

ELECTRIC RAILWAY NOTES.

The equipment of the Brooklyn Elevated Railroad with electricity will be commenced the first week in April, which will call for an expenditure of about $4,000,000.

A press dispatch from Cleveland, Ohio, says that a consolidation of the Akron Street Railway and Illuminating Company and Akron & Cuyahoga Falls Rapid Transit Company is being negotiated in New York.

The law authorizing the granting of 50-year franchises to street railways and prohibiting reduction of fares below five cents, which was passed by the Illinois Legislature two years ago, has just been repealed by the present legislature.

The bill empowering the city of Indianapolis to make a contract with the street railway people, covering franchises and surrounding conditions, became law on March 4. The organization of the new company, which is to take over the Citizens' Street Railroad, of Indianapolis, will now go on rapidly.

A company is being formed at Mount Jewett, N. Y., to build and operate an electric railway from that borough to the now booming town of Hazelhurst. It will be capitalized at $42,000. Cars will be running by the latter part of the Summer, providing there is no opposition to the securing of the right of way for the proposed six miles of road.

The annual election of officers of the Long Island Electric Railway Company resulted as follows: President, A. R. Hart, Brooklyn; vice-president, Charles A. Porter, Philadelphia; treasurer, William L. Wood, Jamaica; secretary, J. C. Vonarx, Brooklyn; directors, Charles A. Porter, William L. Wood, Charles A. Porter, Jr., W. F. Hogan, J. C. Vonarx, H. A. Van Allen, Joseph Hogan and F. M. Harris.

At a meeting of the stockholders of the Winona, Iowa, Marshalltown & Southern Railway, the old board of directors was reelected as follows: N. S. Ketchum, George F. Kirby, A. A. Moore, Charles C. Gilman and A. G. Glick, Marshalltown; E. B. Woodruff, Knoxville, and E. S. Fonda, Osage. The board elected the following officers: President, N. S. Ketchum; vice-president and treasurer, George F. Kirby; secretary, A. G. Glick; chief engineer, C. C. Gilman.

The Brooklyn Heights Railroad Company, of Brooklyn, N. Y., has completed arrangements to extend its service from the Brighton Beach Hotel to Manhattan Beach. The new extension is to be from the terminus of the old Sea View Elevated Railroad at Brighton over new tracks to a terminus about 150 or 200 yards from the Manhattan Beach Hotel. Four new loops have been laid in the rear of the Brighton Beach Hotel, and work on the new road will begin as soon as the weather permits.

Messrs. Tucker, Anthony & Company have completed negotiations whereby they will construct and finance the Peoria & Pekin Terminal Company, a new road to be built between Peoria and Pekin, Ill. It will be capitalized for $500,000 stock and $500,000 five per cent 30-year gold bonds. The company will engage in a general transfer business between the two cities, as well as in a passenger business. The road will be equipped for both steam and electricity, electricity for passenger traffic and steam for the heavy freight traffic. The road will be 10 miles in length, and will serve a population of about 100,000.

The Resistance of Carbon and Copper Brushes.

Prof. E. Arnold, in the *Electrotechnische Zeitschrift* for January 5, 1899, presents a study of the "Contact Resistance of Carbon and Copper Brushes and the Temperature Rise of the Commutator." He finds that the contact resistance decreases with increase of current density, especially with higher velocities of commutator surface; thus, with a velocity of 368 meters (1,205 feet) per minute, the resistance per square centimeter is for .7 ampere per square centimeter .6 ohm, while for 10 amperes it becomes only .1 ohm, beyond which point it is nearly constant. He finds also that for a given current density the resistance increases with speed to a maximum, and then decreases for higher speeds; this he accounts for by supposing an unfavorable relation between the weight of the brush and the periodicity of the vibrations from passing over the segments; this theory is upheld by the fact that the same maximum appears at a lower speed for the heavier copper brush. A highly polished metal surface gives a higher resistance, which oiling increases still further. He mentions eddy currents as producing losses in the segments, and give formulæ for the friction losses and the rise of the temperature.

Magician Houdin and the Arabs.

To witness Houdin's first performance in Algiers the neighboring tribes were invited. The theater was speedily filled with them and the French officials, who attended in all their pomp and glory. Interpreters were scattered through the house in order to repeat Houdin's remarks to the natives in their own language. With true Oriental dignity and gravity, the Arabs witnessed the first few tricks in stolid silence, but the taking of a huge cannon-ball from a borrowed hat aroused great excitement.

Then came the great tricks of the evening, especially prepared to astonish the Arabs.

"By a wonderful power which I possess," said Houdin, "I can deprive any man of his strength. I invite any one to prove my words."

On this being interpreted to the Arabs, a tall, strong man stepped forward on the stage. Houdin held in his hand a little iron box, and, balancing it carelessly on his little finger, he asked the Arab,

"Are you strong?"

"Yes," replied the man carelessly.

"Are you sure of always remaining so?"

"Always."

"Lift that box."

The Arab did so, and asked contemptuously:

"Is that all?"

"Wait," said Houdin, making a solemn gesture. "Now you are weaker than a woman. Try to lift that box again."

The Arab seized the handle and tugged again. He could not raise the box an inch from the floor. After many attempts, he paused for a moment to brace himself for a final effort. He seized the handle again, but shrieked aloud with pain, dropped on his knees, then rising, threw his cloak round his face to conceal his shame, and rushed from the theater, leaving his compatriots stricken with fear. The trick was as simple as the result was startling. The box was placed on a powerful electro-magnet, and the current being complete, no man on earth could have lifted it. An electric shock, sent at a signal by Houdin from behind the stage, was what caused the Arab to shriek and hurriedly retreat.

The Herkimer, N. Y., & Little Falls Electric Street Railroad Company has been granted a franchise by the town to build an electric road from Little Falls to Herkimer, on the north side of the river.

Franklin Institute, Electrical Section.

The regular stated meeting of the Electrical Section of the Franklin Institute was held on Tuesday evening, February 28, with Prof. Geo. A. Hoadley in the chair. Professor Franklin, of Lehigh University, explained several new laboratory experiments that he has introduced with marked success in his class-room work.

Professor Franklin also showed a new type of lamp made by himself, on the same principle as that invented by Professor Nernst, of Goettingen University. The lamps shown were glass tubes about two inches long by one-fourth inch wide, filled with magnesium mixed with powdered glass, a platinum terminal contact being sealed in each end of the tube. In his experiments with these lamps he has secured a very satisfactory light. The paper was discussed by Messrs. Reed, Stine and others.

Mr. Carl Hering spoke of the discovery of a German physicist, made while conducting experiments with the modern electric forge. He observed that the current was interrupted, and upon clearer investigation found the action at the terminal points immersed in the electrolyte caused gases to be generated at their points which was immediately set free, causing a very rapid making and breaking of the circuit. He utilized this discovery in building a very simple apparatus to take the place of the mechanical interrupter used in connection with the Roentgen-ray apparatus. The device consists of a glass jar, partly filled with dilute sulphuric acid, in which is immersed a lead electrode, the other electrode being a piece of platinum wire encased in a glass tube with only a small end of the wire protruding to make contact with the electrolyte. The device was connected in the primary circuit of an induction coil and gave perfect results as an interrupter, its frequency running as high as 1,500 per second. By using this interrupter the condenser is dispensed with; it in fact gives far better results without the condenser. The apparatus was shown and very fully explained by Mr. Elmer G. Willyoung. Mr. Balderston exhibited an improved form of static X-ray machine, manufactured by the American Roentgen Ray Company, of Boston, Mass. This machine was especially adapted for the emergency work of surgeons.

The subject of "Conduit Wiring and the Character of Conduits" was discussed by Messrs. Eglin, Lafore, Pike and Holman.

PROPOSED CONSOLIDATION OF INDEPENDENT TELEPHONE MANUFACTURERS.

AN EFFORT TO GET ALL THE LEADING ESTABLISHMENTS INTO ONE ORGANIZATION WITH CHICAGO HEADQUARTERS—NUMEROUS OPTIONS SECURED, BUT OTHERS HOLDING BACK—THE GENTLEMEN INTERESTED IN THE PLAN—LIST OF MANUFACTURERS.

The rapid growth of the telephone manufacturing industry since the expiration of the basic Bell patents is a noticeable feature of the electrical field. There came a prompt demand for this valuable instrument from sources that the Bell interests had permitted to remain uncultivated during the enjoyment of the exclusive rights of the inventor's patents, and small telephone exchanges have sprung into existence in all parts of the Union, particularly in the Middle and Southern States. The demand for private line and interior telephones has also been enormous. Electrical manufacturers were not slow to realize the importance of this sudden need, and as a consequence capital and technical ability have here found an outlet that has proved profitable and attractive.

These manufacturing companies, although always in opposition to the American Bell Telephone Company, have never been united, but have each sold instruments and apparatus to all customers that could be secured, and a lively, and at times bitter, competition has sprung up among the so-called "independents." Many of them entered the construction field, and equipped and owned exchanges in the smaller cities, supplying telephone exchange service where there had been none before, and often entering the field in direct competition with established systems. This has often resulted in the operation of two exchanges in the one town, the subscribers using both services.

It is now proposed to organize all the independent manufacturers, if possible, into one strong organization, and a number of options have been secured, and a well backed syndicate of Chicago gentlemen is endeavoring to put through the plan. Among the gentlemen said to be interested, outside the telephone manufacturing field, the names of Chas. D. Irwin, W. P. Williams, Chas. T. Trego and Jesse P. Lyman are given, and the Illinois Trust Company, of Chicago, is said to have the question of underwriting the proposition under consideration. During the last two weeks the work of getting the consent and options of the manufacturers has been vigorously prosecuted, and the recent important convention in Cleveland was the occasion of many of the leading men in the business conferring on the subject.

The ELECTRICAL REVIEW after very general investigation finds that while nearly all the eastern companies are willing, there is considerable opposition on the part of several successful western manufacturers, and it is difficult to state yet what the probabilities are. One element that has caused the promoters much trouble is the fact that there are several large electrical manufacturers who only turn out telephone apparatus as one branch of their business, and these companies are disinclined to enter into the consolidation, evidently believing that if it is effected there will be an excellent opportunity for increasing their output in this respect.

The number of exclusive manufacturers of telephones and telephone apparatus is quite extensive and their factories are quite widely distributed. Below is published a list of the houses in this field:

American Electric Telephone Co., Chicago, Ill.
Bissell & Co., Toledo, Ohio.
Central Telephone and Electric Co., St. Louis, Mo.
Connecticut Telephone and Electric Co., Meriden, Ct.
De Veau & Co., New York, N. Y.
Ericsson Telephone Co., New York, N. Y.
Eureka Electric Co., Chicago, Ill.
Farr Telephone and Construction Co., Chicago, Ill.
Gordon, A. Y., Massillon, Ohio.
H. M Fisk Manufacturing Co., Wheaton, Ill.
Kellogg Switchboard and Supply Co., Chicago, Ill.
Keystone Electric Telephone Co., Pittsburgh, Pa.
Kokomo Telephone & Electric Manufacturing Co., Kokomo, Ind.
Kusel Telephone and Electric Manufacturing Co., St. Louis, Mo.
Mason Pay Station Telephone Co., Ludington, Mich.
Mianus Electric Co., Mianus, Ct.
Moon Manufacturing Co., Chicago, Ill.
Murdock & Co., Wm. J., Boston, Mass.
National Automatic Telephone Co., Chicago, Ill.
North Electric Co., Cleveland, Ohio.
Northwestern Telephone Manufacturing Co., Milwaukee, Wis.
Pennsylvania Electric Co., Lancaster, Pa.
Rawson Electric Co., Elyria, Ohio.
Reliable Electric Manufacturing Co., Worcester, Mass.
Russell-Tomlinson Electric Co., New York, N. Y.
Schmitt & Bruckner, New York, N. Y.
Standard Telephone and Electric Co., Madison Wis.
Sterling Electric Co., Chicago, Ill.
Stromberg-Carlson Telegraph Manufacturing Co., Chicago, Ill.
Telephone Manufacturing Co., Sumter, S. C.
Taber & Mayer, Boston, Mass.
Tobie, W. S., Augusta, Ill.
United States Automatic Telephone Co., New York, N. Y.
Viaduct Manufacturing Co., Baltimore, Md.
Victor Telephone Manufacturing Co, Chicago, Ill.
Western Telephone Construction Co., Chicago, Ill.
Williams-Abbott Electric Co, Cleveland, Ohio.
Williams Electric Co, Cleveland, Ohio.
Whitman & Couch, Boston, Mass

Among the electrical manufacturing companies who also manufacture and supply telephone apparatus as a branch of their business are the following:

Bunnell & Co, New York N. Y.
Central Electric Co., Chicago, Ill.
Holtzer-Cabot Electric Co., Boston, Mass.
Jones & Son, J, New York. N Y.
Manhattan Electrical Supply Co, New York, N. Y.
Ohio Electric Works, Cleveland, Ohio.
Stanley & Patterson, New York, N. Y.
Western Electrical Supply Co., St Louis, Mo.

The National Electric Light Association and the Electrical Show.

Contracts have already been closed for space in the New York Electrical Exhibition far in excess of those signed at a corresponding date in advance of the 1898 show. All the exhibits this year will be shown in the amphitheater. The scope of the exhibition includes not only electricity, but also all kindred industries. The exhibit of automobiles will be larger than any ever held in this country, the section set aside for this purpose having been already oversubscribed for. Exhibitors of boilers, engines and steam specialties will undoubtedly be pleased with the arrangement which brings them up from the basement onto the main floor of the exhibition hall. The space allotted for these lines is almost entirely disposed of at this early date, so that exhibitors interested will do well to make speedy application.

A special section will be set aside for patents and inventions, the idea being to enable inventors whose goods are not yet on the market to display them here to thousands of interested persons, including investors, at small cost.

This will be the last electrical show of any size in the century just closing, which may well be called an electrical century. Judging by the demand for space New York city should have a building at least three times the size of Madison Square Garden to accommodate all these branches of trade, now that we have renewed prosperity.

In addition to the convention of the National Electric Light Association, there will be meetings of other engineering societies every day during the show. For the benefit of the trade all these meetings will be scheduled in advance, and lists of participating members will be furnished to exhibitors. Special days will be arranged for the exporters and also for the people who will be interested in the electrical development of Porto Rico and Cuba.

An Electrical Supply Catalogue.

J. H. Bunnell & Company, the well known electrical manufacturers, corner of Cortlandt and Washington streets, New York city, have just issued a thoroughly complete and businesslike catalogue. This book covers a very complete list of telephone and telegraph supplies, as well as all electrical goods in general. An always interesting feature is a manual of telegraphy with description of instruments adapted for private telegraph lines. The book will be mailed free to any address on application.

A New Arc Lamp Catalogue.

The Petite arc lamp has been handsomely illustrated in a recent catalogue issued by the Western Electric Company, Chicago and New York. The lamp is made in a number of different styles, so that it is suitable for use under different conditions. In the catalogue can be found some timely and valuable information regarding the care and operation of enclosed arc lamps. As the Petite arc lamp is suitable for street-railway plants, power circuits and isolated plants, these catalogues should be in the hands of those connected with installations of this kind. Any of our readers who have not received a copy of this publication can secure one by writing to the company.

New Carbon Companies Formed.

The Phœnix Battery Manufacturing Company, recently incorporated at St. Louis, with a capital stock of $250,000, one-half paid, is the successor of the Phœnix Carbon Manufacturing Company. The latter company some time ago sold to the National Carbon Company the department which manufactured carbon for electric lighting. It retained its battery manufacturing and other departments, and it was decided to reorganize the company and incorporate under a new name. The stockholders in the company are S. M. Dodd, J. C. Van Blarcom, James Campbell, Allen T. West, Albert Blair, S. B. Pike, S. G. Booker and J. C. Van Blarcom, trustee.

It is reported that Mr. John S. Speer, formerly of the Partridge Carbon Company, of Sandusky, Ohio, will establish in the East a new plant for the manufacture of carbon brushes.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D C. Copies of any patent may be secured for 10 cents each.]

ISSUED MARCH 7, 1899.

(Concluded.)

620,654 Electric railway; R. M. Hunter, Philadelphia, Pa.

620,665 Electric arc lamp; M S Okun, New York, N. Y. -A globe enclosed below the arc, a tube leading thereto and connected tightly therewith a carbon carrier or feeder passing into said tube, a plug or plunger carried by said carrier or feeder and fitting snugly in said tube so as to travel therein, and carbon regulating or feeding mechanism.

620,679 Apparatus for removing electricity from the human system; J. W. Shryock, Pueblo, Colo.

620,683 Process of and apparatus for reducing and oxidizing salts; T. A. Uehling, Cleveland, Ohio.

620,703 Municipal signal; Edward Davis, Boston, Mass.

620,715 Connector for electrical conductors; Peter Minich, Indianapolis, Ind.

620,720 Electric heater; R. A. Parker, Detroit, Mich.

620,733 Telephone system; C. L. Boyce, Detroit, Mich. – A local ringing and talking jack-circuit, which is normally open, and has normally no earth connection, a source of electricity and earth connection, and means for closing said local ringing and talking jack-circuit to earth through said source of electricity, whereby said local ringing and talking jack-circuit becomes also the local busy-test circuit.

620,745 Telephone central-office circuit; H. M. Crane, Boston, Mass.

620,746 Means for impressing semi-cycles of electro-motive force on electric circuits; A. C. Crehore and Geo. O. Squire, United States Army—Consists of an alternating generator producing two alternating electro-motive forces of the same periodicity, of circuit-interrupting devices adapted to make and break circuit at instants when the current flow is actually zero, and to impress said electro-motive forces on the circuit so as to cause semi-cycles of current to flow in the desired order or relation, and those in immediate succession to be of the same or opposite sign.

620,759 Electric arc lamp; O. Eschwei, New York city—Consists of a clutch for the upper carbon, a solenoid having a core provided with a flange, and a connecting-rod extending from the clutch and screwed into the said flange, so that the upper end of said rod is adapted to strike against the solenoid, such screw connection between the rod and said flange, permitting the adjustment of the rod in the flange.

620,778 Transmitter for multiple telegraphs; W. A. Houghtaling, New York.

620,783 Electrical regulator; W. H. K. King, Carthage, Mo.—Consists of receiving-plates and delivery-posts, of vibrating spring-contacts for changing the polarity of the current passing through the said posts, a clock mechanism mounted in the said casing, an escapement connecting the said mechanism with the said vibrating springs, a pendulum connected with the said escapement, and means for controlling the extent of movement of the pendulum.

620,806 Electric train-signaling system; B. C. Seaton, St. Louis, Mo.

620,829 Valve; J. F. Batchelor, New York, N. Y.

620,839 Electric switch; W. B. Bernardini, Lakewood, R. I.—A stationary guideway, a rotatable shaft, an arm extending at right angles from said shaft and pivoted thereon in such manner that each is capable of partial rotation without reference to the movement of the other, a cross-head adapted for reciprocating movement in said stationary guideway, a link pivoted to said arm and cross-head and connecting the two, an actuating lever pivoted independently of said shaft and adapted for engagement with said arm, and an extensible spring connecting lever and cross-head, all combined with each other and with a base.

620,852 Electric railway; J. F. Munsie, New York, N. Y.—Comprises a series of contact boxes placed at intervals along the track, each provided with two independently actuated circuit-closers operated by the transit of a car, cooperating with a collector mounted on the car adapted to hold both circuit-closers closed during the transit of a car, and connections for completing the circuit from a supply conductor extending along the track to the car when both circuit-closers are actuated

620,855 Thermo-chemical electric battery; M. L. Severy, Boston, Mass.

620,864 Electric clock; Jos. Butcher, Melrose, Mass.

620,865 Railway rail bond; H L. Des Anges, Hoboken, N. J.—Consists of rails, having grooves in the tops of the treads thereof, and a bond for electrically connecting the rails, fitting tightly within said grooves.

ISSUED MARCH 14, 1899.

620,930 Circuit-breaker; T. J. Johnston, Schenectady, N. Y.—A switch, a trip, an electro-magnet and armature for operating the trip, and a device for altering by steps or aliquot portions the pull necessary to actuate the armature and trip and open the switch.

620,965 Alternating-current motor; E. W. Rice, Jr., Swampscott, Mass.—An induction motor comprising an induced part, a primary member comprising a closed-ring iron core, a plurality of inducting coils arranged in recesses in the face of the core, some of such coils being set at an angle to and overlapping the others, and means adapted to short-circuit some of such coils at will.

620,966 Induction motor; E. W. Rice, Jr., Schenectady, N. Y. — Single-phase mains, an alternating-current motor containing three angularly-displaced windings, one of which receives current by inductive action from the other two, and all of which receive energy derived from the single-phase mains, and means for shunting one winding by a device adapted to shift the phase of current in said winding.

620,986 Frequency changer; C. P. Steinmetz, Schenectady, N. Y.—Two or more mechanically-connected induction motors coupled in tandem, and absorbing power from a supply circuit with a working circuit of different frequency from the supply circuit connected in multiple with the secondary of one such motor and the primary of the succeeding motor in the series.

620,987 Frequency changer; C. P. Steinmetz, Schenectady, N. Y.

620,988 Self-starting alternating-current motor; C. P. Steinmetz, Schenectady, N.Y.

620,989 Starting device for electric motors; C. P. Steinmetz, Schenectady, N. Y.

620,990 Frequency changer; C. P. Steinmetz, Schenectady, N. Y.—A transformer or induction motor, and a synchronous generator geared to run in unison therewith, with a source of alternating currents of given frequency supplied to the primary of the motor, and a circuit for supplying current to translating devices, connected in multiple with the generator terminals, and with the secondary of the motor.

620,996 Electric arc lamp; J. T. Tschieret, Levallois, France.

620,998 Self-setting annunciator indicator; F. C. Van Dyck, Jr., New Brunswick, N. J

621,001 Electrical device involving hermetically-incased conductors; N. G. Warth, Indianapolis, Ind.—An electric cable, an impermeable and hermetically-sealed sheath containing fibrous insulating material and rarefied air, which latter in part forms the dielectric for the conductors when the cable is in use.

[Concluded next week.]

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Kindred.... ...Interests

The Western Electric Company announces that it carries the only stock of interior conduit in Chicago. As is well known, the standard rubber-covered wires can be placed in these conduits without violating the underwriters' rules. Contractors should get prices on conduit and wire from the Western Electric Company before purchasing elsewhere.

The Lombard Water-Wheel Governor Company, Boston, has received orders for three additional type "B" governors, for the plant of the St. Anthony Falls Water Power Company, of Minneapolis. The above governors are for the three additional units of four Victor turbines each, which are now to be installed. This will make in all 10 Lombard governors in the above-named plant, regulating 40 water-wheels.

The electrical supply business which has been conducted by J. A. Erner & Company, Columbus, Ohio, will in the future be carried on under the firm name of Erner & Hopkins, Mr. W. A. Hopkins, Jr., having purchased an interest. Mr. Hopkins has been identified with Mr. Erner since the business was commenced. The construction work will be continued under the firm name of J. A. Erner Construction Company.

The Williams-Abbott Electric Company, 8, 10 and 12 Columbus street, Cleveland, Ohio, manufacturers of the Williams-Abbott magneto bell, which they claim is as near perfection as can be, both electrically and mechanically, have lately introduced into the market a new double-pole telephone receiver, which they say beats them all. It is built on scientific principles and is an excellent "talker." Descriptive matter, relative to this receiver, will be cheerfully furnished on application.

The Western Electric Company, Chicago, presents a very handsome fan-motor catalogue for 1899. It is very artistic in design, and contains valuable information for intending purchasers. A most complete line of fan motors is shown, consisting of high-grade apparatus, for both direct and alternating current, in desk and standard ceiling motors. The description of the desk fan motors shows a very handsome machine of four blades, in various sizes, fitted with brass protective bracket, switches, etc. Standard ceiling fans are fitted with four blades for direct current, but may be operated with two blades. The switch is arranged so as to provide three speeds. For alternating current these ceiling fans have two blades. Under each cut of the various types presented in the catalogue are tables showing the voltage, speed, current consumption, and shipping weight. Switch rheostats are also shown, and a list price on parts, etc. The catalogue is complete in every detail and will be ready for the trade in a very short time.

Street Railway Map.

PRICE, $15.00 NET.

Robert H. Derrah has just completed a map showing all existing and projected street railway lines in Massachusetts, Rhode Island and Connecticut, as well as the steam roads. A glance at this map will show how one will soon be able to travel from Boston, or points 50 to 75 miles east and south of Boston, to New York by the electric cars via South Framingham, Worcester, Springfield, Mass., Hartford, New Haven and Stamford, Ct.

The map is drawn to a scale of four miles to the inch, is mounted on cloth and printed in five colors. There is considerable hand work on the map.

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Extra Battery, 30 cents. By Mail, 50 cents.
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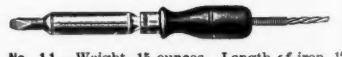

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